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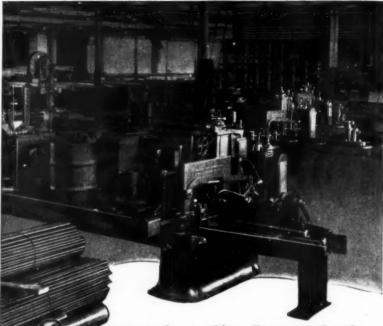


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Machine Tool Blue Book

Hitchcock Publishing Co., 542 So. Dearborn St., Chicago 5

Published Monthly

Volume 41, No. 12

DECEMBER 1945

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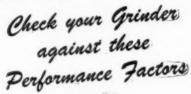
The fact that you don't need to pamper FILMATIC Bearings, regardless of the grade of finish desired, is still another reason why you should choose Cincinnatis for your centerless or centertype grinding and lapping operations. Booklet G-446 contains the complete story. Write for your copy.



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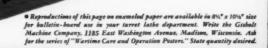


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In addition to such uses as stretchpress and hydropress dies, jigs, assembly and holding fixtures, foundry patterns, and masking shields for plating. Durez casting resin is now being utilized very successfully in the production of models used for testing markets for consumer items.

DISPENSER AND CASE RING

While working with Durcz casting resin for industrial patterns, the Westwood Engineering Co. decided to apply the same techniques and material to the production of test models. The gratifying results are illustrated.

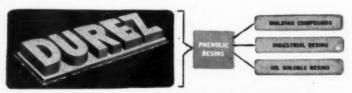
The cone-shaped piece is a top for a sugar dispenser. Note its unusually thin wall section. The other piece is an instrument case ring. Molds for both these parts were made direct from the originals of other material.

TWO-HOUR CURE

Standard procedure for most Durez resin castings calls for a four-hour set after the resin has been poured into the mold. This is then followed by an eight-hour baking period. Owing to the small size and thin walls of these pieces, they were cured in less than two bours.

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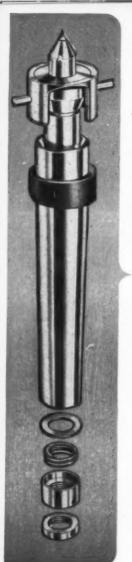
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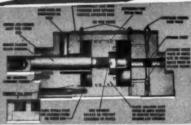
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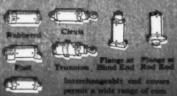




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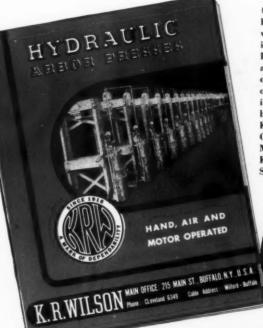
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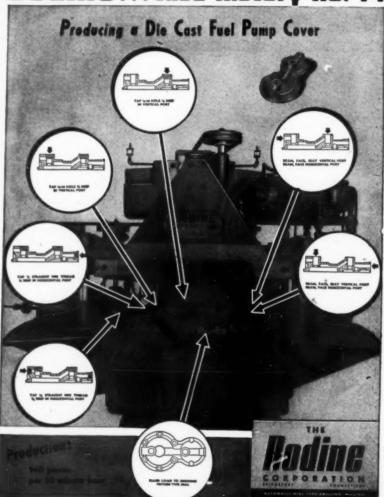
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The easy way to make Dies and Similar Tools accurately — Cut direct labor costs 50% to 60% — The Oliver of Adrian Die Making Machine was perfected on the theory it is quicker, cheaper and more accurate to saw and file a piece than drill and chip—all plants large and small should have one or more Oliver Die Making Machines.

TYPE S-I.

A bench type efficient die making machine with $8 \, 1/2$ " throat which permits sawing to center of 17" circle. Tool steel up to 1" thick can be sawed and filed. 10" square table tilts 10° right, left or forward.



WE CAN MAKE EARLY DELIVERY

HEAVY DUTY -

This machine will saw and file metals up to 3" thick. Sawing can be handled up to 20" circle center from 100 to 300 strokes. 14"

to 20" circle center from
100 to 300 strokes. 14"
square table tilts 15° to front, left or right, and 3" to
back. Constant controlled pressure feed. No work
spoilage.



OLIVER INSTRUMENT CO.

1408 E. MAUMEE ST. ADRIAN, MICH.



PRODUCTS

Don't Neglect Your Toolroom It's the Backbone of Production!



AUTOMATIC DRILL GRINDERS—TOOL AND CUTTER GRINDERS—DRILL POINT THINNERS—TEMPLATE TOOL GRINDERS—FACE MILL GRINDERS—DIEMAKING MACHINES

Saw More METAL CUTTING MACHINES

FULLY AUTOMATIC 10 x 10 B.A.M. L. B. MODEL SHOWN

OTHER MODELS
6x6 or 10x10 MANUAL or AUTOMATIC



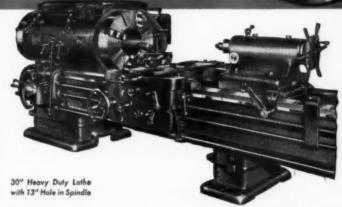
FOUR SPEED GEAR BOX TRANSMISSION SPEEDS OF 65, 93, 120 AND 149 S.P.M. ALL MACHINES SWIVEL ON BASE TO 45° FOR ANGLE CUTTING

WRITE FOR SPECIFICATIONS

MAQUOKETA COMPANY

We Won't Get Faster Production Until We Get a Hydratrol Lathe





Hydratrol Lathes

LARGE HOLLOW SPINDLE TYPE

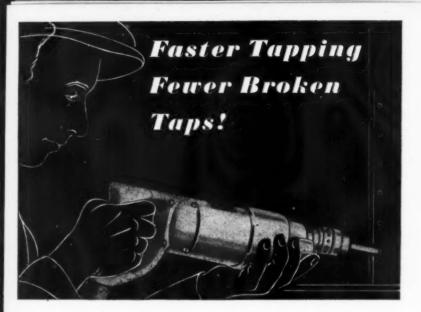
For Faster Production ... Better Work ... Lower Costs!

Look around your own shop—you may find a number of machining jobs which could possibly be done better on a Large Hollow Spindle Type of HYDRATROL LATHE. Send us prints of these unusual, difficult, or too-costly machining jobs, for a time-and-money-saving recommendation.

5 Sizes-18" to 36"

(Standard type lathes, 16" to 36")

Lehmann MACHINE COMPANY



CP Universal Automatic Tappers

THE instant automatic control of CP Universal Automatic Tappers offers many advantages in production tapping and retapping. Tap breakage in blind, shallow holes or obstructions is minimized through the adjustable clutch, which slips at a predetermined overload. Reversing

mechanism is also automatic—and speedy. Slight pressure affords right hand rotation, while backing tool away from work instantly reverses the rotation. Capacities range from 3/16" to 3%" in steel and 3%" to ½" in aluminum. Write for a copy of Catalog No. 899.





Wheels of Progress

TURN ON Axelson-Turned AXLES

Turned metal work is the hub and center of all mechanical operation. So when, for instance, you think of axles, think of Axelson. "Wheels of Progress" must rurn on close tolerance axles, for these wheels must run true, and fast and unfailingly. Axelson beavy duty Lathes have been setting the pace for machine tool

progress for over thirty years. Today, when machine tools mean so much in keenly competitive work, you can place your full confidence in the time tested Axelson Lathe, Quality counts and in the Axelson Lathe, now as always, you can count on quality.



INGERSOLL

Cutters and Cutter Grinder

Ingersoll specializes in the design and manufacture of inserted blade milling and boring tools for use on all makes of milling and boring machines. A wide variety of standard types and designs of face mills, half side mills, staggered tooth slotting, helical slab and end mills cover most milling and boring applications. Modifications of these standard designs and special cutters are made to suit the unusual conditions. Cutters are furnished with high speed steel, cast alloy, or carbide tipped blades.



Write for cutter catalog describing complete line of standard inserted blade cutters.







CONVENTIONAL FACE MILL

INGERSOLL SHEAR CLEAR

BOURLE ANGULAR CUTTERS

To obtain best results with your milling cutters it is essential that they be properly ground. The Ingersoll cutter grinder is particularly designed for grinding face milling cutters at a single setting from 4" to 30" in diameter with maximum peripheral face of 7". It will also grind solid shank, radius, staggered tooth, and angular inserted blade cutters. It is fast, accurate, and may be operated by the average mechanic.

The attractive 19" x 23" grinding chart gives basic grinds for standard milling cutters. There charts are suitable for mounting in a conspicious place in tool rooms and are available for free distribution on request.



Write for cutter grinder bulletin which illustrates the wide range of application of this grinder and assists the operator in the best methods of grinding.





THE INGERSOLL MILLING MACHINE CO., ROCKFORD, ILL., U.S.A.

Now!
CHECK
BORES
FASTER
more accurately

NO PILOT NECESSARY



DuBo

SINGLE END Sizes 1.510" to 6.010" (38mm. to 152mm.)

DOUBLE END Sizes 240" to 1.510" (6mm. to 38mm.)

... that New, Better
PLUG GAGE



DuBo Tells More...More Easily

PATENTS PENDING

Spherical gaging surface, chamfered, relieved and self-piloting enables DuBo to be inserted easily into bores of extremely close tolerance.

Finger-tip "feel" and control reveal internal conditions at any point in the bore. Light weight minimizes fatigue errors.

Out-of-roundness, taper, belling and dimensional deviations revealed by unmistakable tilt of handle.

May be used in deep bores and close to the bottom of blind bores.

Plastic color signals, Green for Go, Red for Not Go, make identification easy, prevent errors in reading.

Chamfered edges automatically wine bore and help prepare a clean surface for accurate gaging. HERE is a radical improvement over old-style, limit plug gages. DuBo is designed for

greater ease-in-use, finer precision, more thorough inspection, faster gaging. Its unmatched lightness and balance give fingertip control and amazing sensitivity in revealing internal bore conditions ordinarily passed over by common cylindrical plug gages.

Write for Special Bulletin



STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.



CHICAGO

STEEL PRESS BRAKES—HAND AND POWER BENDING BRAKES—AND DIES FOR ALL STANDARD MODERN PRESS BRAKES



Forms boxes or pans from one piece of metal.

A straight brake as well as a box brake.

Ideal for experimental shops.

All Chicago Brakes are built of rolled steel welded sections which insures great strength, accuracy and long life.

Up to the minute in design and workmanship, they fit the present need for fast production sheet metal working machinery.

We also build special machines for intricate bending operations.

Take advantage of our experience of over 40 years by sending to us any difficult bending problem you have.



POWER BENDING BRAKE—
Indispensable wherever a volume of heavy
plate work is done—forms a great variety of
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HAND BRAKE—
Improved to meet modern needs. Efficient and dependable—sturdy and durable.



Compact, powerful money-saving production unit. Replaces cumbersome costly machines that are expensive to operate. Uses same dies as larger machines.



LARGE PRESS BRAKE-

The only press brake which turns out perfect work without shims and crowned dies. Patented non-deflecting bed equalizes pressure over the full bending length and overcomes major fault in solid bed press brakes.

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SEND FOR NEW BOOK "FORMING PRESS DIES AND THEIR USES"

low to Select the B<u>est</u> Balancing Tool or <u>Your</u> Work

Here's a complete line of balancing tools which will handle a large number of diversified parts. They are widely used on airplane propellers, automobile tires, cotton gin brushes, crankshafts, flywheels, cones, pulleys, polishing wheels and other products.

Select the balancing tool best suited to your work from our nine sizes and types.



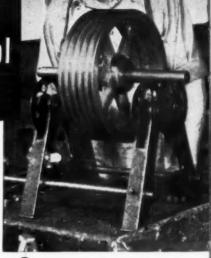
Standard Bench Type.



Adjustable floor type. Floor types furnished in 4 different models.



Airplane Propeller Balancing Stand.

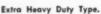


Checking vee-belt pulleys with Super-Sensitive Bench type — will indicate outof-balance small as five grains on a 3" radius in work-piece weighing 1½ lbs.





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MACHINE TOOL COMPANY

2535 Eleventh St. . Rockford, Ill., U.S.A.

PROSSER Carbide Grinders





For fast, efficient rough grinding and tine linishing of carbides, stellite, high speed steel, and other modern tools, install Prosser Carbide Grinders. Their rugged construction, modern design, and ease of operation insure long, dependable and profitable service.

Prosser Carbide Grinders are built in bench and floor models of several capacities, for wet or dry grinding. Attachments for chip breaker and drill grinding.

Important features include:

- · Quick-acting indexing tables.
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- · High grade ball bearing spindles.
- Oversize wheels, giving longer wheel life, and permitting grinding of larger tools.
- · Moderate price.
- Prompt deliveries.

Write for details

Thomas Prosser & Son
120 WALL STREET • NEW YORK S, N. Y.

4 TOOLS LAST AS LONG AS 5

FINISHES BETTER...COSTS LOWER

SUNICUT...

Increases tool life by 25%...improves finishes

Turning . . . threading . . . tapping tough carbon steel, stainless steel and monel metal (aster, better and at lower costs. That's the record of a large Pennsylvania shop when it switched to Sunicut.

lacreased tool life and better finishes was the aim of the production manager. With Sunicut, he was able to obtain a saving of 25% in tool life, improve finishes on every operation and at the same time eliminated the necessity of various grades of cutting oils.

Outstanding transparency, high heat absorbing and excellent metal wetting

qualities of Sunicut make possible longer tool life, finer finishes and increased operator interest. This clear, transparent, sulphurised cutting lubricant has proved its production value in the leading metal working plants of America.

In your plant let Sunicut help you increase the lile of cutting tools, improve finishes, and step up production. If you are faced with a metal working problem, remember there's always a Sun Cutting Oil Engineer ready to help you . . . just write

SUN OIL COMPANY - Philadelphia 3, Pa. Secont of the Sunga News Value of the Air-Lovell Thames

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OILS FOR AMERICAN INDUSTRY



SAVE THESE FOR WORK A MACHINE CAN'T DO



HC – 5 – ½ H.P., multispeed countershaft unit, 900 to 3600 R.P.M. Mounted benchheight on 3-leg caster Urinding—Sanding—Rotary filing—Wire brushing— Buffing and Polishing—all are machine operations. There are many more.

All can be done better and faster, with a greater degree of efficiency, by using a Haskins Flexible Shaft Machine. And this with much less strain and fatigue on the part of the operator.

Write for Catalog 45, showing many ways to speed production with flexible shaft equipment. And remember—save, your hands for work a machine can't do.

R. G. HASKINS CO.

623 South California Ave., Chicago 12

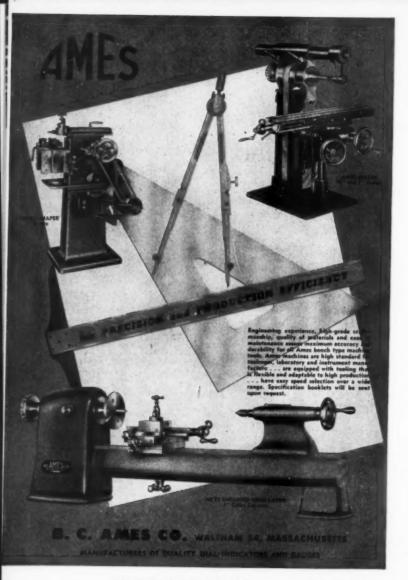
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FLEXIBLE SHAFT EQUIPMENT

December, 1945

MACHINE TOOL BLUE BOOK

43



BORING DRILLING MILLING All This and More with a PORTAGE No. 4



Accurately finished products . . . speedily produced . . . are now possible with the new Portage No. 4 Horizontal Boring, Drilling and Milling Machine. Designed with an unusually high factor of safety, this new machine is built for long service combined with low maintenance costs. Complete interchangeability of parts is provided by a complete system of jigs, figures and gauges.

- Accuracy, rigidity and speed assured as entire Bed is a heavy reinforced one-piece casting
- Controls conveniently located for safety and ease of operation
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 . . . with large tables and extra height columns

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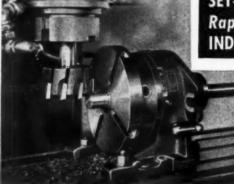
THE DOOT GE MACHINE CO.

AKRON 11. OHIO

The HARTFORD

SUPER-SPACER
with FACE-PLATE and
DRAW-IN COLLET





HOLDS INDEXING WORK SECURELY and makes heavy cuts ACCURATELY

This milling operation on bar stock is just one of α wide range of jobs, handled to advantage when the Super-Spacer is mounted with a face-plate and draw-in collet combination. This setup permits a real saving in production time and the precision spacing device may be adapted to α broad range of difficult machine operations.

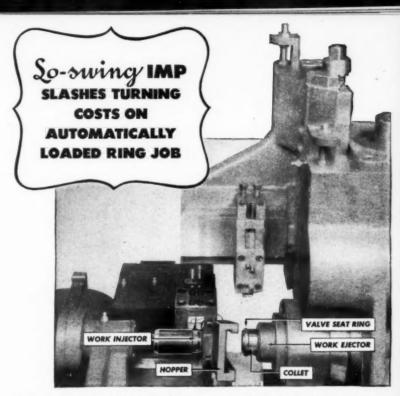
These are a few of the reasons why the Hartford Super-Spacer is favored in important plants for speedier chucking and indexing.

ting and other operations in which precision indexing is required.

adaptable for drilling, grinding, slot-

Equally

Let us send you bulletin giving complete details. THE HARTFORD SPECIAL MACHINERY CO.



Problem: To automatically load and unload, rough turn, finish turn and chamfer the outside diameter of Valve Seat Rings.

Solution: The IMP Automatic Lo-awing Lathe selected for this job was equipped with the Seneca Falls Ram Type Loader used successfully on many types of small parts with a substantial reduction in manufacturing costs.

Rings are loaded in the hopper (shown in above illustration) and are automatically picked up and placed on the air operated collet by the work injector.

Two carbide tools on the front carriage rough and finish turn the outside diameter while one edge is rounded and the other chamfered by two tools set on the vertical slide. All tools then withdraw, pressure on the collet is released, and the work ejector thrusts the finished piece into the unloading chute.

The entire cycle is automatic; the spindle revolves continually—even during loading and unloading thereby reducing starting and stopping fatigue on the motor, pulley, belts and other drive mechanisms.

A similar tool layout is used for the boring operation on these rings; the only difference is that the piece is held on its outside diameter instead of from the inside.

Seneca Falls Engineers have vast experience in the successful designing of automatic loading equipment for all types of Lo-swing Lathes. Why not let them solve your postwar machining problems?

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

LATHE NEWS from SENECA FALLS

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Precision and quality always have been primary considerations at Cadillac Gage Company. For Cadillac engineers realize that upon the precision of their workmanship and the quality of the gages they manufacture depend the quality of the work produced by Cadillac Gage customers.

Unsurpassed quality, painstaking workmanship and the highest standards of precision, however, are not the

only reasons why production men in ever increasing numbers specify Cadillac for their thread gaging equipment. Cadillac's immense stock of over 10,000 gages in all standard sizes provides gages for immediate delivery—a time-saving and money-saving feature.

Next time you order thread plug or thread ring gages, specify Cadillac . . . and let Cadillac standards protect your high standards of manufacturing.

...5 TO 20 TIMES
THE WEAR WITH
* STELLITE *

Have you a job that is really tough on gages? Try Cadillac STELLITE Thread Plug Gages! See for yourself that these gages will give 5 to 20 times the wear of regular steel gages.

Cadillac

GAGE COMPANY

20316 HOOVER ROAD . DETROIT S, MICH.



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Special forms
are precision
ground of hard
ened high speed
steel or tungsteen carbide,

Lefe: High peed ground hread milling utters, scienifically heat reated for onzer life. Dalzen manufactures an extensive line of precision cutting tools, parts, thread grinding and special machines—engineered for maximum efficiency and economical operation. Each is the result of years of experience on the part of designers and craftsmen. These are reasons why, all over the United States and in many foreign countries, master meeting who have used and worked with Dalzen ade machines and tools say, "You can do it be er with Dalzen." Write for details on how Dalzen, an "do it better" for you.

Bcow No. 5
Elean Control le control le control le control speed, other features.

Thread Geinder Compact, upright design aves floo space. Simple to operate. Low fire and maintenance cost. Ideal for those or production run Dave: Dalzen "2in-1" sombines a depend hie accunue cene lapping machine with a gundy dell less.



TOOL AND MANUFACTURING CO. 12255 EAST EIGHT MILE ROAD . DETROIT 5, MICH.



UNIVERSAL and **PLAIN** MODELS

- * INFINITE SPINDLE SPEEDS
- **★** MOTOR-IN-BASE DRIVE
- * STANDARDIZED SPINDLE NOSE
- ★ HEAVY RUGGED CONSTRUCTION
- * CENTRALIZED CONTROLS
- ★ DESIGNED FOR SUSTAINED ACCURACY AND TO GIVE YEARS OF TROUBLE-FREE SERVICE

From the sturdy heat treated chrome-nickel steel spindle to the completely enclosed motor drive, here is a milling machine designed for speedy low cost accurate production work. It is sufficiently sturdy to stand up in heavy duty service. Speed and feed changes, push button control and clutch lever are centralized for easy operation. The table is designed to give years of hard use while retaining its shape and alignment. The table has both power longitudinal and power transverse feeds. Capacity is 11" swing, 24" between centers. There are many up-to-the-minute features.

Let us send bulletin giving full details.

J. L. LUCAS & SON INC. BRIDGEPORT CONN. U.S.A.

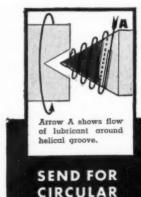


-Your Assurance of "Red Hardness"

Under the Most Severe Shop Conditions!

This "Red-Hardness", abrasion-resistant alloy is torch-welded (not brazed) on to the center tip—midway from point as illustrated. Torch welding fuses the cobalt-tungsten alloy with the steel base of the center and assures a new standard of rigidity and long economical service. Mail coupon for circulars on "Red Hardness" Centers and standard Helical Groove Centers.

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Please send circulars with "Red Hardness" Groove Centers.			
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This thinner Blade



Only .032" thin, the blade in the Johnson Metal Cut-off Bandsaw cuts straight and true—and economically. Loss of expensive metal is held down to less than 3/64" per cut! That's performance that makes sense and savings.

Other Important Johnson Features

- 1. 3-point base insures even cuts
- Box type frame protects movable parts
- 3. Four speeds provide right speed for every metal, hard or soft
- Hydraulic control insures even pressure throughout cut
- 5. Coolant attachment minimizes friction, prolongs blade life
- Automatic shut-off after cut is completed

WRITE TODAY FOR FULL DETAILS

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5000 CHRYSLER BLDG.

NEW YORK 17, N. Y.



GRINDS TWICE AS FAST

THIS foundry was using flexible shaft grinders for truck blocks. Speed was only 3500 r.p.m. Maintenance costs were high.

The Rotor Application Engineer suggested light, powerful Air grinders—8500 r.p.m. for 4" x 1" x %" wheels and 6000 r.p.m. for 6" x 1" x %" wheels. Rotor D-77 and D-100 Powerplus Grinders were installed. Results, according to the Master Mechanic:

100% increase in grinding rate. Less fatigue for operators.

Lower maintenance, No more flexible shaft breakages from bending around sharp corners.

Feel free to call the Rotor Application Engineer anytime to suggest improvements in your portable tool operations.

Yours for faster grinding,

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AIR

THE ROTOR TOOL

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UNBLASED ANALYSIS OF PORTABLE TOOK PROBLEMS

HIGH

Use the COMBINATION DRILL TABLE and VISE



SPEEDS DRILL PRESS SET-UPS

Simplifies the most difficult set-ups. Holds work of all shapes securely, without angle plates, clamps or supports. Just drop in the work and start to drill.

The Combination is made in various sizes — diameters from 8" to 27½", weighing from 27 to 600 lbs. Made of the finest materials, for long life. Easy to install. Specify shank diameter in thousandths of an inch. We supply the drill table and vise with shank turned to size specified.

GUARANTEE

We guarantee the Combination will save its cost in labor alone in six months. You are the judge.

FREE TRIAL

We will ship to rated concerns under this guarantee, on free trial. Should you decide not to keep the tool we will even pay return transportation. Order Today!

Circular on Request.



Gives full information and illustrates typical, set-ups. Shows use on radial drills. Complete specifications of all models including the square, all steel tables.

MODERN MACHINE TOOL CO.

Fackson Michigan



SPERRY COMPRISATING GUNSIGET

Sefore Weldes Truste Retaining Rings were used in Sperry Gyroscope Co. gunsights, vibrations occasionally caused important taper pins to loosen and fall out. This affected the gunsight's accuracy while in service. Frequent careful inspections of taper pins didn't entirely solve the problem.

\$a they specified Waldes Truerc Rings and the pins were held fast. Assembly of the gunsights became simpler. Then Sperry developed their K-13 compensating gunsight, making Truarc Rings original equipment. Truarc exceeded their highest requirements for dependability.

Woldes Truerc Retaining Rings are used to save weight, space, and man hours in a wide range of products. For holding and positioning machine parts, they have definite advantage over nuts, shoulders, collars, and pins. They can be put on and taken off again and again—and still retain the perfect circularity which gives them their unfailing grip. Test them yourself. We'll furnish samples and complete data. Write Dept. M-12.

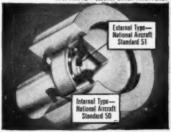
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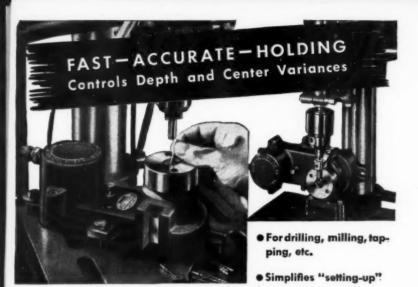


RETAINING RIN

WALDES HOMINOOR, INC., LONG ISLAND CITY 1, NEW YORK . CANADIAN REPRESENTATIVES: PRENCO PROGRESS CORP., 73-74 STAFFORD ST., TORONTO

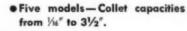
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The Redmer Air Chuck is an air operated collet holding fixture, using same type collets as Brown & Sharpe automatic screw mamachines.

- © Eliminates jigs and fixtures
- Ideal for assembly work
- Simple in construction and operation



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608 W. WASHINGTON BLVD., CHICAGO 6, ILL.



CHATTERLESS COUNTERSINKS

GIVE MIRROR FINISH ..

If your production calls for perfectly finished seats, you simply can't beat Severance Chatterless Countersinks. In a few seconds, they produce a finish that will stand up to a commercial ground job. Using a standard type, a finish sufficiently smooth for valve seatings may be obtained. Because of their staggered tooth design, they take clean, shearing cuts—thereby eliminating chatter. Available with any angle and in a wide variety of diameters, lengths

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Rickert Shafer

R-S Bench Style TAPPER
THE ORIGINAL FRICTION DRIVE TAPPER



for TAPPING GAUGING REAMING BUFFING etc.

Built in 3/16" and 5/16" sizes complete with motor integral toggle switch and cord. Other models for belt drive in bench and pedestal mountings.

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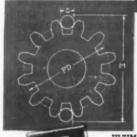
Van Keuren simplified GEAR MEASURING

SYSTEM



... provides

GREATER ACCURACY...and SIMPLIFIED CALCULATIONS



. The only calculation required is one of Simple! . simple division.

Reliable! . . . The system is based on formulas approved by the American Gear Manufacturers Association.

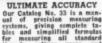
Accurate! . . . Van Keuren Gear Measuring Wires are accurate to within 25 millionths of an inch for roundness and exact size.

Van Keuren gear measuring tables give the measurements (M) over the wires (G) for I diametral pitch gears of correct pitch diameter (PD). The only calculation required is to divide the measurement for I diametral pitch by the diametral pitch of the gear being measured.

ACCURACY

The tables are complete for gears

The tables are complete for gears from 5 to 171 teeth and for pressure angles of 14½°, 17½°, 20°, 25° and 30°. The tables provide for measuring external, internal and helical gears. They are far more accurate than anything previously available and no interpolations are required.



Our Catalog No. 33 is a man-ual of precision measuring systems, giving complete ta-bies and simplified formulas fer measuring all standard threads, splines, gears, and worms. Send for this valuable handbook.



175 WALTHAM ST., WATERTOWN, MASS

JACOBS PRODUCTION CHUCKS with the RUBBER-FLEX COLLET "THE COLLET WITH A RANGE"



Now is the time to profit by this unique development in chuck design for modern efficiency and economy in manufacturing—especially in the operation of multiple spindle machines doing heavy duty drilling and reaming.

Jacobs Production Chucks — small in diameter and consistent in accuracy — provide three salient advantages: 1 Ability to handle an unusually wide range of drill sizes. 2 Extreme simplicity which features the Rubber-Flex Collet of one-piece construction ground as a unit after molding. 3 Ever-parallel jaw gripping surfaces that assure full-length hold on drill or reamer shanks.

The entire unit is sturdy — contains only four simple parts — stands unusual use and abuse without loss of accuracy or gripping power. The chuck socket receives the flatted tang of the drill and will take all drills having the same flat size. On most applications — because of the tenacious grip of the Rubber-Flex Collet — standard drills can be used without slippage!

12 OR 300?

12 Jacobs Production Chucks and 3 Arbors Cover More Than 300 Single Purpose Chuck Applications!

DESIGNED FOR POST-WAR ECONOMY

PERMIT DRASTIC REDUCTION IN TOOL INVENTORY COSTS

Featuring "the collet with a range"

Here's how the new design and construction principle of the Rubber-Flex Collet will bring substantial savings in tool inventory and operating costs and assure long-sustained accuracy to your machine operations:

The multiple jaws accurately spaced in opposing made of hardened alloy tool steel.



position are

They are molded in a special and are internally and



compound of oil-resisting Neoprene externally ground after molding.



At rest, the Neoprene holds jaws parallel and ready to receive or to release the drill shank. It is now in the position of maximum capacity.

When chuck is tightened close, gripping the drill



the Neoprene is displaced and the jaws shank firmly.

At maximum capacity the jaws are always full length bearing.



parallel and have a

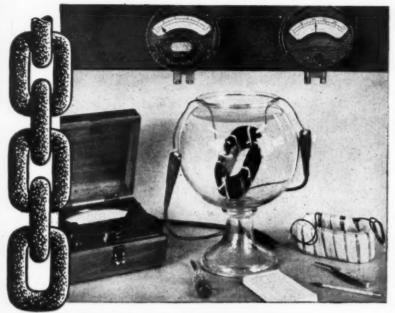
At minimum capacity, and have a full length



the jaw bites are still precisely parallel bearing.

Write for Special Bulletis, P-5 today. The Jacobs Manufacturing Co., Hartford 2, Conn.

THE NATIONAL STANDARD FOR



NO CHAIN IS STRONGER THAN ITS WEAKEST LINK!

1. No chuck is better than its coil.

No coil is better than its wire and insulation.

The coil must be made of high grade wire and extra quality insulation: unless this is carefully specified and held to rigid inspection, no after treatment can or will improve the coil.

- 2. Coils must breathe to dissipate energy.
- Studies and countless laboratory tests lead to conclusions that revert to these basic principles.

O. S. WALKER CO. — the original chuck builders, accepts the modern challenge and sets the pace for the advanced production methods of tomorrowl

O. S. WALKER COMPANY, INC. * WORCESTER • MASS. * Makers of Rectangular, Swivel and Rotary Magnetic Chucks

Sturtevant

Jensory

TORQUE

-HEAR-FEEL-SEE-





THEY GAVE

STURTEVANT Tarque Wrenches would win highest hanors . . for out standing performance . . for permanent accuracy . . . for dependability and long tool life . . and for the development of the Sensory Wrench with "Reflex Torque Control"—a truly great contribution to modern manufacturing.

Industry's recognition of P. A. STUR-TEVANT CO's achievements has made this firm the world's largest manufacturer of Torque Wrenches.

WRITE FOR BULLETIN NO.SWIS

PA STURTEVANT CO.

THE WORLD'S LARGEST MANUFACTURERS OF TORQUE WRENCHES

....Things We Want IN Can be Speeded with

Federal WELDERS

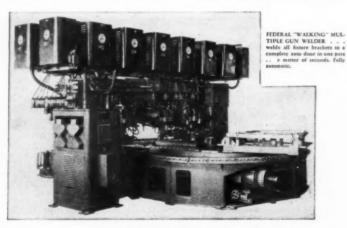
Resistance welders, are built by The Federal Machine and Welder Company, to cut production time and costs on almost any kind of product you can think of . . . and there never was a time when savings in time and cost were as important as today. For instance . . .

AUTO DOORS are something we are all dreaming of having in a hurry (with chassis and engine attached, of course). The automotive industry employs more resistance welding to cut costs and speed production than perhaps any other single industry; all the way from small spot welders (by thousands) to special Federal machines like the door assembly welder pictured below.

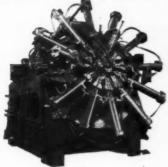
REFRIGERATOR PARTS are mass production items on which Federal Resistance Welders for years have done a big job saving both time and cost. This includes production of grilles, boxes, liners and such tricky items as the refrigerator cooling fin assembly, completed in ten seconds by the Federal Radial Projection Welder pictured on the next page.

STOVES... back in production on a large scale to meet vast pent-up demands, are more swiftly made in modern plants by the use of numerous welded sub assemblies. A typical example is the gas-stove oven liner, welded in a fast, low cost operation on the Federal Multiple Spot Welder shown at right.

AND WHAT HAVE YOU... from pin-point-welded radio parts to complete steel sides for freight cars; from pots and pans to heavy assemblies involving flash welds of eighteen square inches cross-section at one whack... anything in which metal parts must be permanently, cheaply and rapidly joined. Federal designs and builds machines for any and all resistance welding applications... wants to show how they can speed your kind of production.



URRY!





FEDERAL RADIAL PROJEC-TION WELDER illustrates how odd shaped stampings of all kinds can be assembled with great economy and speed, by completing this eight-inch-diam-eter cooling fin assembly, 48 projection welds at once, in to

FEDERAL MULTIPLE SPOT WELDER speeds stove production by welding this oven liner (on four sides at once) into a sturdy, economical sub-assembly.



NAME OF AUTHORITY IN RESISTANCE WELDING

MACHINE AND WELDER CO.

216 DANA ST., WARREN, O.



VERSATILE MODERN PRODUCTION TOOLS

10 to 20 SPOTS PER SECOND

For fabricators of metal who have production involving ten to several hundred fastenings on one several nundred lastenings on one plane a special type of automatic spot welder is available in which automatically operated electrodes are set up in multiples, much like a gang drill. Power demand is comparatively low, as electrodes weld one at a time in rapid sequence. For high production, machines may be had with electrodes in any desired pattern.
Called Ultra Speed Spot Welders.

these machines are made by The Federal Machine and Welder Company. Descriptive literature available on request. "Bulletin

ALUMINUM WELDING SIMPLIFIED

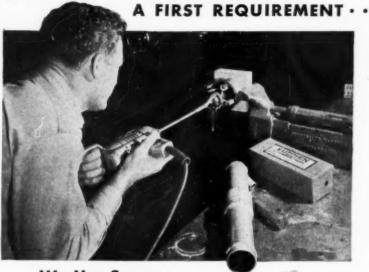
Important developments in equipment for automatically resistance welding aluminum, acclerated by critical war demands, are now being applied to the speeding of production in every branch of industry, from the making of household utensils and appliances to auto bodies, parts, and accessories

Difficulties encountered in welding aluminum alloys were due to the narrow "margin of safety" in their thermal response. The extreme accuracy of timing heat and pressure required were difficult to attain until perfection of stored energy" principle ned with full electronic the combined

controls. The Federal Machine and Welder Company, perfected the first suc-cessful welders built specifically for aluminum. In collaboration with manufacturers of electronic controls, this company developed the Federal Unipulse System, in which a capacitor bank is charged (during comparatively long periods between welds) to a precise voltage level, then discharged directly into the welder as a single, uni-directional current pulse for production of the welder pulse for production of the welds.

Among the important advan-tages of current Federal Aluminum Welders are ... increased welding speed, higher quality welds, in-creased volume of production per cleaning of electrodes and lower KVA demands on the power line. Remarkable uniformity and high mechanical strength make it possible to design parts where stress may be involved with a full measure of exactness not possible with old methods.

"WHERE SMOOTH SURFACES ARE



We Use SunnenPortable Cylinder Hones"

LOCKHEED AIRCRAFT CORPORATION

On landing gear assemblies, bushings, actuating cylinders, etc., Lockheed Aircraft Carporation has found that Sunnen Portable Cylinder Hones do an outstanding job. Metals are usually very hard and the honing removes scratches and distortion, produces a mirror-smooth finish. The illustration above shows a Lockheed worker honing a sleeve of a landing gear part.

The Sunnen Portable Cylinder Hone will produce a straight, true hole with a guaranteed accuracy of .0005"— and a surface finish of from 2 to 3 micro-inches. It will correct errors of out-of-round and taper; is portable—can be taken to the job; operates in any position without misalignment; maintains original alignment of bore; is simple to use and works in any metal except lead or babbitt.

If you have an internal finishing problem, call a Sunnen engineer for assistance — or write for free bulletin.

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Canadian Factory: Chatham, Ontario



SUNNEN

S-A-Hol-Down Clamp Secures Work Pieces in Record Time!

Speed reconversion tooling. Set up your shop in absolute minimum time. With S-A-Hol-Down Clamp you lower production costs, get flexibility with greater speed.

Eliminate the old bolt and bar method. The S-A-Hol-Down Clamp can solve any problem around the drill press. Get 8,000 lbs. per square inch of equalized pressure with this compound leverage. Holds firm under fast drilling without turning or shifting. Practical for either precision or production work.

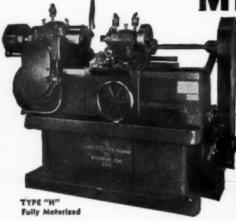
Order direct today. \$2450 f. o. b. Cordele, Ga.

Trade Mark Reg. Patent Pending

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CHUCK it
You can
THREAD it on . .

COULTER HOBTHREAD MILLER



THE RAPID
DUPLICATION
OF RIGHT OR
LEFT HAND
THREADS
INTERNAL
OF
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Hob thread work can be handled with high speed and precision on this rigid, simple, fully motorized machine. The range of work it is capable of handling is practically unlimited. Any parts that may be held in ordinary chucks, air operated chucks, or special face plate fixtures can be threaded advantageously. Design of the machine permits accommodation of long work.

Work and cutter spindles are driven by individual motors. A wide range of speeds and feeds is available for threading parts of various materials. Maximum external thread capacity is 7"; minimum hole depends on smallest hob practical.

It will pay you to investigate the profit possibilities of Coulter equipment by writing for further information.

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For Jet Propulsion and Gas Turbine Broaching

SPLINE BROACHES UP TO 84 INCHES LONG. Complete Broach Tooling and Engineering Service . . . GAGES, Serration or Spline, male or female . . . Master Gears and Gear Racks . . . Master Index Plates . . . Splined Arbors for gear-grinding . . . Hobbing, Shaving and Checking . . . Production Broaching and Machining. Available from stock, Radius Gages for checking form and hook on broach tooth forms.

Broach & Gage Company

GRENBU HYDRAULIC GRINDING MACHINES

FEATURES

- Infinitely Variable Longitudinal Traverse
- Hydraulic Cross Feed
- Coolant
- Precision Spindles
- · Heads Swivel For Angle Work
- Grinding Heads To Convert For Internal Grinding (See Cut)

EG103 SPECIFICATIONS

Werk Capacity—3" Dia. x 10" Length Workhead Accommodates—Collets 1" Max. Hole —Chucks & Face Plates 4" Max. Floor Space & Wt. 45" Long x 25 Wide—1600 lbs.

THE
GRENBY MANUFACTURING
COMPANY
PLAINVILLE, CONNECTIOUT





INDEX VERTICAL MILLS

FOR THE TOOL ROOM OR PRODUCTION LINE

For use with end mills 1/2" to 1" in steel. Equipped with verniers, as standard equipment in addition to micrometer dials on table actuating screws for locating. Further accuracy available with rods and indicators which can be furnished as extra equipment.

If you want speed and precision on milling, drilling and boring send for a catalog on Index Mills.



12" TOOL ROOM ROTARY TABLE



A quality teel for precision work in the teel reem or production line, incorporating such features as hall bearings—hardened and ground worm—quick acting threw-out for free hand turning—single movement table lock that does not cramp table out of alignment—compound trough. 22 size only.

INDEX MILLS

Index Mills participated in all important war production programs from camera and guns to atomic bombs. Ask any owner how they like their Index Mill.

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BLANK & BUXTON MACHINERY CO.

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SPEED UP RECONVERSION ...



USE WARREN CITY'S FAST, EFFICIENT SERVICE ON HEAVY-TONNAGE WELDMENTS AND ASSEMBLIES

IF TIME is a critical factor in your reconversion plans, Warren City has the unusual production facilities and know-how to help you.

Our seven-million dollar plant is one of the most modern and complete shops in America for fabricating heavy machinery, parts and assemblies. Among its more than 600 pieces of large-capacity equipment are modern planers, shapers, milling machines, flame cutters, boring mills, grinders, lathes, automatic welders, cranes and stress relieving furnaces as well as extensive normalizing, X-ray and other testing apparatus.

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DEPARTMENT : WARREN, OHIO

Wholly-Owned Subsidiery of GRAHAM-PAIGE MOTORS CORPORATION

HOFFMAN WAS BE CURE FOR YOUR COOLANT "HEAD-ACHES"!

1 REJECTS ... CUTTING

3 CLEANING OF MACHINE SUMPS TOO COSTLY!







DING WHEELS & CUTTING THE RING OUT TOO FAST!

★ Coolant control by Hoffman Filtration is the answer. Hoffman Filtration Equipment puts precision finishing on a volume basis, controls the quality, definitely reduces number of rejects.

★ For conserving life of grinding wheel and cutting tools, there's no coolant like a clean coolant. Hoffman coolant filtration reduces wheel glazing, saves many wheel redressings.

★ Hoffman filters with automatic sludge disposal are the answer to this one—permit practically continuous operation, reduce maintenance.

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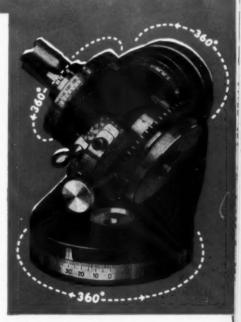
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COOLANT FILTERS - FILTRATION ENGINEERING SERVICE

Cut Tool Maintenance . . . Reduce Manufacturing Costs with The CLEVELAND UNIVERSAL INDEXING HEAD

Now you can regrind your tools . . . in your own shop . . . on any surface grinder . . . in a fraction of the time usually required. Maintaining your tools in tip-top shape, with factory precision regrinds, will help reduce your manufacturing costs.

360° graduations in three planes enable you to regrind or sharpen your tools with any desired angle or cutting edge. Automatic Indexing, provided with a vernier adjustment, permits the re-establishment of concentricity on tools where one or more cutting edges have been unduly worn or damaged.

Only the Cleveland Universal Indexing Head provides three plane 360° settings plus compensating automatic indexing. Now available from stock at a new reduced price.



New Bulletin Available

Write today on your business letterhead for copy of the new bulletin on the Cleveland Universal Indexing Head. See how you too can reduce your tool maintenance costs. There's no obligation.

GRINDERS AND FIXTURES, INC.

1249 West 4th St.

Cleveland 13, Ohio



The ONLY Saw on which the coolant attachment is an integral part of the machine. A complete wet-cutting unit that has the SAME ORTABILITY — And the SAME OPERATING CONVENIENCE as the standard unit.

And — the ONLY machine with an enclosed saw frame that atches all drip on the back travel and eliminates all slop and mess.

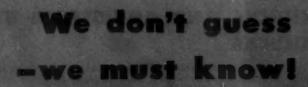
Not a makeshift — but a properly designed coolant model saw hat permits cutting accurately at highest production speeds, and on my metal.

Write for information or ask your dealer.

MACHINE TOOL DIVISION

Kalamazoo Tank & Silo Co., Kalamazoo 16, Mich. In Canada — Bridge Machinery Co., Montreal

Kalamazoo Metal Cutting Band Saw



ALL MATERIALS that go into Woodworth gages are tested in one o several specially built wear-test machine developed by the N. A. Woodwortl Company to supplement its ultra-mod ern laboratory facilities,

To insure long-lasting precision hundreds of materials—from glass to beryl lium copper—have been checked to prove wearability. We don't guess—w must know!

The test machine operates with combined rotary and reciprocating mo-tion, to simulate exactly the "wringing" tion, to simulate exactly the "wringing effect of a gage in actual use. At th same time, pressure is applied agains the wearing surface of the gage, thu creating friction. Woodworth test gage are subjected to punishing wear-tests a high as 350,000 cycles, each cycle con sisting of an up and down stroke.

And then-each gage must pass rig orous tests in ou own high produc tion plants for accu racy and wearabil we must know!

THE WOODWORTH WEAR TESTER

PATENT U. S. A. NO. 2362554 CANADA NO. 426441

Close-up showing test gage reciprocating under pres-sure between wear blocks.

ACCURACY YOU'N CAN TRUST

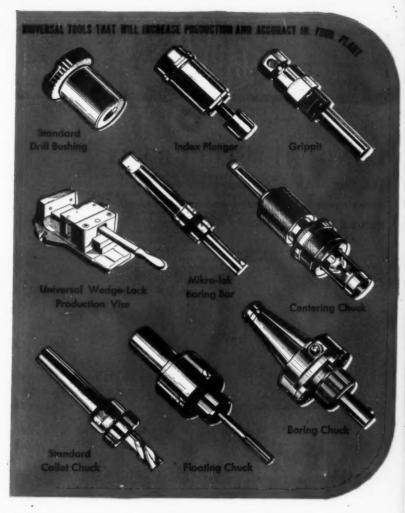
DODWOR'

N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD . DETROIT 20, MICHIGAN PRECISION BAGES . PRECISION MACHINED PARTS . PRECISION FOOLS

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Universal Centering Chucks make a centering machine of practically any medium size drill press. Furnished with collets and bushings to hold and guide a wide variety of center drills. Bushings are beveled to form conical surface that fits firmly over ends of shafts to be centered. Depth of drill penetration easily regulated within few thousandths. Universal Adjustable Stop Chucks control the depth of holes and countersinks on hand feed machines. Revolving stop arrangement operates on ball bearings, eliminating excessive wear to stop portion and







UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH, MICHIGAN X Fighter Plane Given by Employees 6 Employee Bend Deductions





LONG LIFE ACCURACY

The first MARVECO sold is still in operation. It has never been repaired and a recent check shows a runout of .0003.



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See for yourselves the MARVELS of MARVECO.

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It is too apparent for comment that future designs will depend on precision parts if these designs are to function correctly. It is equally apparent that the selection of reliable gages and a proper over-all gaging method will play a large part in the correct assembly and interchangeability of parts. One way to insure this is to join the ever-increasing ranks of those who use Vinco's Gage Engineering Service when planning new production schedules. At all times, Vinco is ready to discuss the complete subject of gaging, together with the attendant problem of production, with your engineering staff. Our assistance to your engineers in establishing and setting up a complete and comprehensive gaging policy, suited to your individual needs, will be gladly given.



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VINCO CORPORATION. 1877 SCHAEFEE HIGHWAY. DETEGET 27. MICHIGAN, SALE OFFICES, NEW YORK, CHICAGO, CLEVELAND
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- Your band saw blades cut better and last longer because the adjustable jaws maintain the saw with the maximum support. When adjustments are needed, a simple turn of the micrometer screws and presto... the adjustment is made! No stoppage! No hazard. Speed your band saw wheels to 1800 rpm, and CARTER guide wheels attain the amazing speed of 27,300 rpm.
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 - Send now for information on CARTER accessories that will save you money on your band saw operations.

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Your high speed taps may be well and accurately made. But why let it go at that when, today, you can get so much more for the same money. Before you buy, ask yourself these questions:

Are They COLD-TEMPER Tops?

Deep-freeze treatment at 120° below zero in addition to the usual heat treatment makes taps stronger but less brittle. COLD-TEMPER Taps produce cleant; better threads and more of them per tap—not only on steels, cast iron and alloys, but on plastics and other abrassive materials.

Only Threadwell Taps are COLD-TEMPER Taps.

Are They Color "i-dot-ified"?

Taps look alike. Errors in tap selection are avoided by modern use of color identification—nd dot on the shank for cut thread, white dot for commercial ground, blue dot for precision ground.

Only Threadwell Taps have "i-dot-ification."

Are They Individually Plastic Packed?

Taps are precision tools. They merit complete protection against dirt, dust and damage. Transparent plastic provides perfect individual protection and permits ready selection without unwrapping.

Only Threadwell Ground Thread Taps come in the metal-capped tap-capsule,

Are They Greaseless Rust-Proofed?

For speed and convenience, taps should be clean and dry to handle.

Threadwell taps have a special greaseless rust-proofing.

Are Your Tap Needs Given
Personal Attention At the
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Threadwell personal attention service applies to every order, large or small. The Threadwell distributor in your locality has been carefully selected for his ability to provide that kind of service. May we put you in touch with him?

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AUIOMATIC Stooving Tools FOR HIGHER PRODUCTION

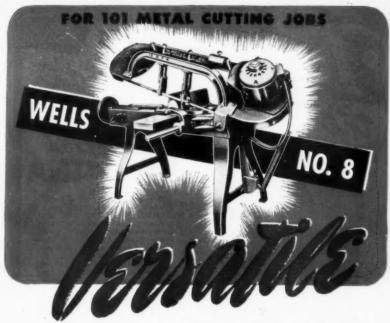
You can groove faster, more accurately and economically with a Scully-Jones recessing tool. These automatic tools are suitable for production work on Turret Lathes, Automatic Screw Machines, Drill Presses or Horizontal Boring Mills for grooving, undercutting, recessing, necking and facing.

Adjustment is provided for the tool bit after grinding as well as location of groove and correct depth setting to control the diameter of recess.

Send us blueprint or sketch of your recessing problem

for a quotation.

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ON SOUTH POCKWILL STREET - CHICAGO & D. S. A.



Here, in the Wells No. 8, is one of the most useful and versatile machines you can have in your shop. You will use your Wells for all types of cut-off work around the plant—in the stock and tool rooms and for maintenance.

It efficiently cuts bar stock, angles, square or round tubing—all types of metals. For production work, your Wells can be equipped with the new Wells Wet Cutting System for faster cutting and blade saving. Because it's portable, you can save time and labor by moving the saw to the work.

The gravity-feed and automatic shut-off make it possible for one man to operate two or more Wells saws simultaneously. Why not write today for full information?

Specifications

CAPACITY	: 1	Re	eta	ing	wl	ur.					*				8"	×	16"
(Spec	iet	6	Swin	des	1								*		5"	×	24"
ROUNDS:									9					8"	Die	3 (9)	eter
MOTOR:			0		0	٠,		0	0		8	6	H.P.	, A	c.	-	D.C.
SPEEDS:				5	ele	cri	**	60,	9	0,	136	9	feet	-	er i	mi)	nute
WEIGHT.												_		44	e .		.mela



Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION 707 COOLIDGE AVENUE, THREE RIVERS, MICHIGAN

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Did you ever hear of a transmission going haywire on a TANNEWITZ DI-SAW? No, neither did we, though we have been making die saws for a good many years. And that's just typical of the superior construction of the entire machine. It can take the severest kind of use and always be ready for the next job. Moreover the standard model has larger wheels than customary in machines of this type — a full 24 inches —

for greater traction, straighter, faster sawing and more production. Get the complete facts and you'll discover why TANNEWITZ DI-SAWS always show

the best possible return on an investment in equipment of this kind. Write for "DI-SAW" Bulletin.

OTHER MODELS TO HANDLE WORK OF PRACTICALLY ANY SIZE

make available the tremendous savings of inside and outside sawing, filing and polishing on dies, jigs and other work too large to handle on the standard machine. Bulletin on request.

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Many new Putnam end mill items have been added . . . size ranges on others extended . . . so that, today, nowhere will you find so complete a line of end mills as Putnam offers you. And, even more important, all of these standard Putnam Hi-Speed End Mills are available to you right from stock . . either on dealers' shelves or at our factory . . . ready to be shipped you immediately on your order.

You can depend upon Putnam Hi-Speed End Mills to deliver top cutting performance always. Why be satisfied with less when you can get the best without delay?



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STOP DUST with



DUSTKOPS

Require no duct work: Install in minutes.

New style, low cost, spun glass filter, is fire-safe, easy to shake down and seldom needs renewing.

Model 420 for small tool grinders, surface grinders, small wheel buffers, polishers, sanders, etc.

Model 1150 for large wheel grinders and polishers. Has extra large storage drawer for dust.

Two new DUSTKOPS for use on all types of dry grinders, polishers, buffers, sanders, etc. Entirely self-contained with motor driven fan, cyclone separator and filter, DUST-KOPS recirculate cleaned air back into working space.

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Insures Lower Production Costs for YOU

QUALITY Precision Built

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2. Built Right

3. Priced Right

Our customers like this 3 Point Policy. It keeps production costs down-helps keep them "in line." * Every tool we design and build

must measure up to this yardstick. If you need tools to get work out F-A-S-T and without interruption. drop us a line TODAY!

ALITY TOOL & DIE CO.

Manufacturers of "Quality" Products







Knock-Out UNIVERSAL TOOL GRINDERS ARE READY ...

For postwar production and maintenance too.

Ready! Yes, ready to serve on the tremendous job which is still ahead. When the war began Knock-Out Tool Grinders were ready and served their country and Allied Nations well. Now, as reconversion becomes a reality Knock-Out Grinders are once again ready to take their place on the production line and on tool maintenance work.

A product is no better than the tools with which it is cut and shaped. Keep those tools sharp and keep them right! Whether you're using high speed steel or carbide tipped cutting tools, there is a K-O Grinder built to accommodate your needs. The low original cost and negligible upkeep on Knock-Out Grinders makes hiring others to do cutting tool maintenance highly impractical.

Knock-Out Engineers have made available more time-tested grinder fixtures than has any other manufacturer. If it can be done—it can be done more easily and economically on a K-O Grinder.

Get in touch with Knock-Out at Aberdeen of with your nearest K-O distributor.



K. O. LEE COMPANY--ABERDEEN, S. D.



MULTIPLE SPEED UNIVERSAL TOOL GRINDER



SINGLE SPEED LINIVERSAL TOOL GRINDER



UNIVERSAL CARSIDE TOOL GRINDER



CHIP BREAKER GRINDER



NO RECONVERSION PROBLEM HERE— So we're all set to help you with yours

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Write for Bulletin No. 301 on cutting tools and circular on precision production parts.



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A.C.E. SPECIAL CUTTING TOOLS

HI-SPEED OR

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hammering. ACRO DIE SET FULLERS

do the job the FIRST time. No Delay.

Use ACRO PULLERS for saie sure separation. They are just — accurate — in the sure separation. damaged die sets caused by prying or hammering. ACRO DIE SET PULLERS Use ACRO FULLERS for safe sure separation. They are fast—accurate—positive. War plants using these pullers report savings as high as 50% in

ACRO PULLERS are indispensable for the grinding, mounting and fitting time alone.

of punches, enabling the operator to raise punch from die easily, quickly or puncnes, enaning the operator to raise punch from ale easi and smoothly, positively holding the set at any desired height. Order a set loday. Convince yourself of the savings you can make in three sizes. Write now for your tool room. ACRO PULLERS furnished in three sizes.

more information.

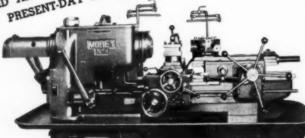
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MOREY Universal TURRET LATHES

THE TURRET LATHE Your Operator APPROVES! EASY TO OPERATE . ACCURATE . DEPENDABLE RIGID AND POWERFUL ENOUGH TO FULLY UTILIZE PRESENT DAY HIGHSPEED CARBIDE TOOLS





For bar stock up to 2" in diameter bed 12" turning length, 191/2" swing over bed Infinite spindle speeds: 35 to 1500 RPM. MAY BE HAD WITH PLAIN CROSS SLIDE constant speed motor, 1200 RPM Also available in No. 3 Universal, 145" capacity ASK FOR DESCRIPTIVE BULLETIN

MOREY MACHINERY CO., INC. 410 BROOME STREET, NEW YORK 13, N. Y.

Fonda Introduces THIS COMPLETE 35 GAGE BLOCK SET THE COMPLETE 35 GAGE BLOCK SET

Available with the Fonda "Ultra-Finish"

FONDA Carbide Gage Blocks are

more abrasive-resistant than steel gage blocks and 98 times more resistant than chrome-plated, under normal shop conditions!

No. 38-C CARBIDE SET

- WEAR RESISTANCE—100 TIMES GREATER THAN HARDEST HIGH-CARRON STEEL!
- Wringing qualities for superior to these of step!
 Meeks,
- Stability absolute—blocks will not change in also size to aging.
- · Non-corrective to innistera or fingarments.
- O Surface finish .2 in .4 s.m.s. or better, ...
- P Size, Sutness and peroficien equal to ar better than Sureau of Sandards' requirements.

. Broom	Steps	Places	THE REAL PROPERTY.
.1001 to .1009	,0001		
.101 to .109	.001		
.110 to .190	.010		1
.100 te .500	.100	5	1 2
000		1	1108
1.000		1	1
1.000			

Rin 65-Place Carbide Set (62-C) has possed PONDA augineering tests and will go into prediction thority., Orders accepted for future delivery. For greater accuracy! No worn gage blocks to replace! Far-reaching economies! FONDA's success in producing the first complete set of Tungsten-Carbide Gage Blocks offered to the public, marks the conclusion of several years of difficult experimentation — and the beginning of an improved new technique for gage block users. Write for all the details.

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FONDA GAGE COMPANY

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Agents in all principal cities throughout the world

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CARBIDE OR STEEL Gage Blocks

44

THE CONTRICT VALUE AND VALUE OF THE CONTRICT O

McCROSKY Jack-Lock MILLING CUTTERS

High Speed, Cast Alloy or Carbide Tipped Blades

for Increased Production, Lower Costs

• You'll get more pieces per day, at lower cost per piece, with Jack-Lock Milling Cutters. Originated, perfected, and available only from McCrosky, Jack-Lock Cutters hold the blades rigidly and solidly permitting safe operation at higher feeds and speeds. Easy release of the blades—and speedy, uniform adjustment,—permit regrinding with minimum loss of stock,—a particular advantage when carbide tips are used. Specify Jack-Lock cutters for your plant,—and get all the design and operating advantages only Jack-Lock Cutters can give you.



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OLS Dack-Lack MILLING CUTTERS

Dosignors and Manufacturers of Block Type BORING BARS

Super Adjustable REAMERS

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ALL RACINE Metal Cutting Machines employ "Pivoted Arm Construction and Open Front Design" combined with "Straight Line Pull on the Connecting Rod." Nearly forty years of research and manufacturing experience prove these principles correct.

The sketches at the right illustrate RACINE'S "Straight Line Pull" as opposed to angular pull. The connecting rod is parallel with the blade. Feeding pressure is directly against proper and adequate bearings provided to carry these loads. The blade is aligned with the exact center of the connecting rod. These features eliminate side and angular stresses, insuring a free running blade and the maximum in cutting speed and accuracy.

The following are added RACINE advantages — Progressive Feed throughout the cutting stroke. The open front facilitates loading. Removable front vise jaws. Replaceable table plates and wear plates on vise jaws. Tee slots in table plates to permit clamping of odd shaped work. Single lever hydraulic operation and control. All these contribute to the work capacity of this equipment.

The long experience and engineering skill that developed the efficiency of RACINE Machines can be applied to your metal cutting operations. Write for interesting Catalog No. 12. Include a brief outline of the work you have to do.

RACINE "Variable Volume" PUMPS



A Modern Source of Hydraulic Force Smooth, oil-cushioned power for your oil hydraulic circuits. Pressures from 50 to 1000 lbs. Capacities 1 to 30 G.P.M. from just one pump. Request Catalog P-10-C for RACINE'S complete line of Pumps and Valves.

RACINE TOOL AND MACHINE COMPANY 1754 State St., Racine, Wisconsin, U. S. A.





PROVES . . .

- *RACINE'S Modern Design, with simple, single lever control, insures easy handling, lower cost per cut.
- *RACINE'S line is complete. Capacities 6" x 6" to 20" x 20". General purpose and high production type machines.



MILLERS FALLS Portable Electric Sanders have made many a production man say that.

It's easy to see why. They do so many different jobs . . . sanding, metal finishing, rubbing, paint and rust removing, stone surfacing, wire brushing . . . there's hardly any limit to their versatility.

The PLUS in these as in all Millers Falls Tools is their quality. It's evident from the moment you first use them. They're good and efficient looking. They're sturdy, powerful, light in weight, but above all—smooth in operation.

Three models for light, medium and heavy production operations, with a complete line of accessories that fit them to any task.

Write for the name of the Millers Falls Distributor nearest you. Try out one of these versatile tools and you too will say, "I don't know how we got along without them."

One Thing in Common-QUALITY!



Millers Falls Company - - Greenfield, Mass.



OW YOU CAN HAVE milling accuracy with tapping speed. In Plan-O-Mill Number 1 all the recognized advantages of planetary milling and threading are provided in a compact, space-saving size designed especially for rockbottom overhead and operating cost. It embodies all of the well-known Plan-O-Mill labor-saving features, including push button operation, simplicity of set-up, and Thy-Mo-Trol electronic feed control-engineered by General Electric and pioneered by Plan-O-Mill-for complete, split-thousandth control of feed-in and feed-around.

Plan-O-Mill Number 1 saves space-requires less than 9 square feet of floor.

Plan-O-Mill Number 1 is fast. It mills in one revolution-a complete part in as little as eight seconds!

Plan-O-Mill Number 1 is versatile. It handles any size part-even parts larger than the machine itself-because the part does not revolve.

Plan-O-Mill Number 1 requires no special skill to operate. Adjustments for wear, for size and character of work are easy to reach and easy to make.

Find out today how this new machine can make your operation more efficient and profitable. For details, contact your machinery dealer, or write direct.

BY PLAN-O-MILL

- First to install General Electric's remarkable new Thy-mo-trol electronic feed control!
- First planetary to mill external threads with standard multiple thread cutter!
- First planetary to coordinate feeds and speeds! First to provide absolute control of feed-in!
- First to offer a practical, low cost carbide thread
- milling cutter!

PLAN-O-MILL CORPORATION

1511 E. EIGHT MILE ROAD HAZEL PARK, MICH.

THREAD AND FORM PEAN (6) MILL MILLING MACHINES THREAD AND FORM PLAN-ED



TEMPLATES ACCURATE TO
#.002" PRODUCED WITH A
WIEDEMANN R-43 IN A
FRACTION OF TIME TAKEN
BY ORDINARY METHODS

New and revolutionary times have been set on accurate template making with the R-43 Micro Turret Punch Press.

The templates are punched, the hole size accurately maintained, and overall center distances held to ± 192". Two rotating turned carry the required punches and dies and thereby eliminate individual set up. A safety mechanism prevents tripping the press unit the turnets are locked in alignment . . . shearing of punches and dies is eliminated.

No layout is necessary. Accurate lead screws, with direct reading dials graduated in thousandths of an inch. assure easy positioning and accurate dimensions.

The lead screws operate at right angles to each other, are absolutely square with each other.

Dimensioning can be done from the ends of the template or from the center lines.

The Micro Turret Punch Press is a method of production whereby all elements necessary to produce accurate templates. inspection piercing templates and many types of Bat drill jigs have been combined for maximum efficiency of motion and effort.



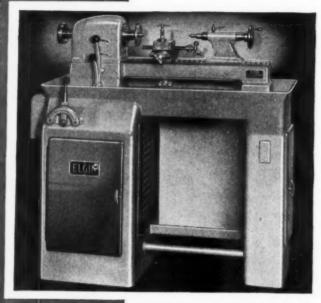
SPECIFICATIONS

Maximum distance, wheel to table	12 inches
1 Wheel	8x1 or 8x1/2x3/4 inches
Table Regular Working Surface	24x6 inches
Knee Bearing on Column	
Spindle Speeds	2600 and 3500 R.P.M.
Motor, 3/4 h.p. Ball Bearing Type	1725 R.P.M.
Weight, complete crated	850 lbs.

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Bulletin
giving full details

H. LEACH MACHINERY CO. 387 CHARLES ST. PROVIDENCE, R. 1. BLGIN:

Makes It



Precision hand screw mach beach borisoned and beach inchines acture the lather world beach drives. In the speed drives.

Note the ample leg room and comfortable foot rest provided for this new ELGIN precision bench lathe. Motor is cross ventilated—three shelves are provided on right hand side and collet bay is on left hand door.

ELGIN TOOL
1772 BERTEAU AVENUE

Easy to Get PERFECT RESULTS

In tool room work or precision production ELGINS will do your precision work better, faster and more economically.

ELGIN gives you the latest advances and construction which assure top performance. There are many other ELGIN advantages which mean increased convenience and comfort. For instance the new desk type bases which provide generous leg room and foot rests, permitting operator to sit comfortably close up and directly in front of work.

Motors are mounted in bases with direct cross ventilation, Shelves and collet boards are within handy reach.

Variable speed drives provide stepless spindle speeds from 120 to 3800 rpm. Speed controls are centralized and within easy reach.

The new automatic clutch throw-out facilitates free-turning spindle for manual work setting.

The compact electrical equipment is quickly hooked up for immediate operation.

The wide speed range and convenient controls encourage operator to use exactly the right speed for every operation, that means high efficiency in present war production and in future peacetime output. Just check these important facts and let us send you further data and prices.



Elgin Screw Machine. Note the easy accessibility of drive equipment. Ample cross ventilation assures proper motor operation. The convenient shelves and collet bar provide handy storage of accessories and supplementary equipment.



Rear View of Screw Machine showing independent motor driven coolant system.



2 unusual hydraulic presses

that can save you Time, Labor and Trouble . .



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easily pressed into a sheave with a few strakes -nate lowered bed.

STOP and think of all the uses you can find for these versatile Rodgers Presses — pulling gears, pinions and wheels; pressing shafts, bushings and pins, squeezing, clamping and bushings and pins, squeezing, clamping and lacking operations—wherever you need 50 to 200 tons of easily-applied hydraulic powers.

The Rodgers Universal is a unique portable unit for field or shop service. It is used on a

stand as an ordinary press, on its side or flat and is easily Shop Presses assembled around equipment for special operations, Rodgers Hydraulic Hand Pump or Power Pump supplies power.

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If you have equipment to service you can ave yourself hours of time and labor with a Rodgers—they often pay for themselves on a tough job or two. Write for all the details. It will be profitable.



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GOOD THINGS AHEAD

It is reported that

A technical magazine states that the war-developed are-oxygen cleetrode will cut quarter-inch steel plate at the rate of a foot per second while under 40 feet of water. Metal and Thermit Corp.

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It is estimated that within a few years 80% of the coal mined underground will be removed from the mines on conveyor belts instead of in cars. Scientific American.

101 ready with CONE for tomorrow

The PV-3 helicopter has a long fuselage with a rotor on each end and carries twelve persons. It is being tested by the Coast Guard and Navy. Popular Science.

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A new cement, for use in concrete flooring, is said to drive away insects, kill bacteria, and prevent the formation of molds. It also dissipates static electricity. H. H. Robertson Co., Pittsburgh.

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An appliance manufacturer announces an electric washing machine that can also, by the use of attachments, wash dishes, peel potatoes, chura butter, and freeze ice cream. Hurley Machine Division Elec. Household Utilities.

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A new gasoline-powered lawn mower resembles a floor ecrubbing machine. It is mounted on four wheels and uses a rotary knife revolving at 3,000 r.p.m. Whirtwind Lawn Mower Corp., Milwaukee.

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The manufacturer of the jet engine used in the P-80 Shooting Star prophesies that all transcontinental planes will be jet-propelled within five years. General Electric. One of the war devices that may survive to help the motorist is the tire gauge that registers on the dash, developed for the Army's amphibious "duck." GMC Truck and Coach Dir.

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A magnetic survey of the state of Florida shows large areas in the southern part that are favorable for the occurrence of petroleum. U.S. Dept. of Mines.

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Meals are being served in the Naval Air Transport Service that are pre-cooked, packed in a covered paper plate and frozen. On the plane they are thawed and heated in a special oven. Mazon Sky Plote, W. L. Mazon Corp., 450 W. 34th 82. New York. Air conditioned trolley cars are being introduced in a Southern city. This is said to be the first use of such equipment in city vehicle transportation. Atlanta, Ga.-Pullman-Standard.

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A new household electric light switch can be set for delayed action up to three minutes. T. J. Mudon Co., 1240 Merchandise Mart. Chicago.

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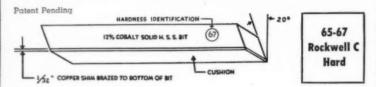
Rubber V-belts molded around a steel cable have been developed to replace chain drive on Army motorcycles. Goodyear, Akron 16, Ohio, Whizzer Motor Co., Los Angeles.

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Even the common wire nail has been improved. The new type has a notch in place of the point and is claimed to be non-splitting. E. S. Gair, Snyder, New York, inventor.



Now — for the first time — a real GENERAL PURPOSE tool using the HIGHEST COBALT HIGH SPEED STEEL . .



PRICE LIST Gushioned Solid 12% Gobalt H.S.S. Tool Bits

			In Lots of					
Si	ze of B	üt	1-9	10-49	50+			
1/4	1/4	21/2	\$.60	\$.55	\$.50			
5/16	5/16	21/2	.80	.75	.70			
%	%	3	1.05	1.00	.95			
7/16	7/16	31/2	1.45	1.40	1.35			
1/2	1/2	4	2.00	1.95	1.90			
5/6	5/8	41/2	3.10	3.05	3.00			
3/4	3/4	5	4.60	4,50	4.40			
7/8	7/8	6	7.20	7.10	7.00			
1	1	7	10.20	10.10	10.00			

The "cushion" does it—you get the extreme Rockwell and RED HARD-NESS of 12% Cobalt H.S.S., plus an EFFECTIVE TOUGHNESS heretofore unobtainable with High Speed Steel Tools.

Gives production increases of from 20% to 200% through increases in speed and feed.

Ideal for shaper and planer work and interrupted cuts.

GUARANTEE: If not satisfied that this is the best GENERAL PURPOSE H.S.S. tool you have ever used—bits can be returned for full credit.

A trial will convince you.

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Year after year BATH taps have delivered thoroughly dependable performance. That is because they are precision made from start to finish. Such performance merits the good name which BATH taps have earned. It explains why BATH taps are preferred for tough threading jobs. If you are seeking a solution to threading troubles, you will find the answer in BATH taps.

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Let us mail your copy of Ground Thread Handbook No. 15-It tells the complete story

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CALLS FOR GAGES OF

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Providing at least 50 times the accurate service life of steel gages.

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Providing at least 5 times the accurate service life of steel gages.

WAR production proved that, in inspection of almost any volume, Lincoln Park wear-resistant thread plug gages make possible exceptional savings in gaging costs. The records of one customer using Lincoln Park Carboloy thread plug gages showed a gage cost of only 3.6 cents per hundred pieces using Carboloy gages, as compared with 19 cents per hundred pieces with steel gages. This is by no means an unusual case, but is typical of almost every instance where these gages have been used. Proportionate savings can be cited where Lincoln Park's chrome plated gages are in service.

Today, as in war-time, you'll find wear resistant thread plug gages will pay dividends in your inspection operations. And today, as in the past, Lincoln Park offers the experience and facilities to produce the best in gages of this type.

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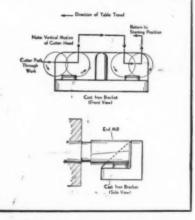


Simple Application of U. S. MULTI MILLER

METHOD EMPLOYS INEXPENSIVE CLAMPING FIXTURE

The line drawings (at the right) are the front and side views of a cast iron angle bracket with a central rib. At either side of the rib, on the horizontal portion of the bracket, there is a circular boss, the top of which is to be milled. The milling of the two bosses is easily handled on an MM-1-5-2 U. S. Multi-Miller utilizing an inexpensive clamping fixture—no indexing is required. The MM-1-5-2 U. S. Multi-Miller, as shown in photograph, is arranged with automatic, cam controlled, rise and fall

motion of the spindle head. The table feed of the machine is also cam controlled, and operates in synchronization with the head movement to produce the desired result. The line drawing shows direction of table movement from right to Icit—i.e., the apparent travel of the cutter through the work is from left to right. It will be observed that after milling the first boss, the spindle head automatically raises so that the cutter may clear the central rib. When in correct position above the second boss, the spindle head automatically descends and the second boss is milled. The head again ascends and the machine table returns rapidly to starting position.



Our General Catalog contains complete specifications for the U. S. Multi-Millers. Ask for your copy. Quotation will be sent on receipt of part prints or samples.

U. S. TOOL COMPANY, INC. AMPERE (EAST ORANGE), N. J.

Builders of U. S. Multi Millers — U. S. Multi Slides — U. S. Automatic Press Room Equipment — U. S. Die Sets and Accessories.

DE WALT offers cut-off power to spare!

- This machine cuts wet with coolant or dry if desired.
- It cuts off wide stock and odd shapes.
- It also cuts metals on an angle.



Power is the keynote of the new DeWalt "Wet-Cut" Heavy-Duty Metal Cutting Machine. Its 15 H.P. DeWalt-built motor, driving an 18" diameter abrasive wheel or steel saw blade, makes it possible to "walk" through the toughest kind of metal. It is this same power that keeps abrasive wheels operating at a constant speed, thus increasing wheel life and accuracy of cut. It is power like this that saves time and lowers cutting cost.

If you have a heavy-duty metal cutting job to do, investigate this DeWalt. Write for full information.

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When you have a problem having to do with design, assembly or manufacture of a product involving fastenings—specify Chicago "Safety Plus" Products. Only the finest raw materials are used, and manufacturing is done with a precision uncommon with this type of product.



These Fine Products are sold only thru Authorized Distributors.



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assures ...

- 1. More Pieces Between Grinds
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The real test of Cemented Carbide is: "How many pieces will it produce during its lifetime?" TECO produces a higher total than other carbides because it has greater resistance to wear and breakage . . . thus remains highly productive for the full life of the tool!

By combining the correct qualities of hardness, toughness and uniformity, TECO metallurgists produce a carbide that holds a keen cutting edge longer and resists cracking or chipping in high-speed machining.

MAKE THIS TEST! Tool up several machines with TECO Cemented Carbide in place of present carbide tools and see for yourself that you get more production out of each TECO tool. Discuss your needs with one of our tool engineers. Send for catalog and price list.

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Plug Thread Gages, "Go" and "No Go"





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DOUBLE END

Size	Description	Net Price	Size	Description	Net Price
5-40	.1088 "GO" L.H	\$ 7.93	9/16-24	.5369 "NO GO" L.F	T
5-40	.1105 "NO GO" L.H.	7.40	3/4-24	.7229 "GO"	14.63
5-44	.1118 "NO GO" CL	2 7.91	3/4-24	.7244 "NO GO"	12.10
10-32		7.91	13/16-10		10.72
1/4-28	.2299 "NO GO" C1.	2 6.63	7/8-12	.8249 "NO GO"	11.50
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1/2-28	.4768 "GO"	11.71	7/8-24	.8514 "NO GO"	13.44
1/2-28		12.82	.916-32	.8957 "GO"	16.26
1/2-32		14.88	15/16-18	.9050 "NO GO"	12.81
9/16-12		8.50	1-8	.9242 "NO GO"	11.48
9/16-20	.5330 "NO GO"	9.13	2-1/8-20	2.0976 "NO GO"	24.47
9/16-24		14.31	2.123-32	2.1027 "GO"	35.40
9/16-24	.5369 "NO GO"	14.14	2.123-32		38.77

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Size	Description .	Net Price
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1/2"-14	A.N.P.T. Thread Gages	35.11
3/4"-14	A.N.P.T. Thread Gages	37.68
1-11-1/2	A.N.P.T. Thread Gages	40.00
3/4	A.N.P.T. Plain Taper Plug	34.56
1	A.N.P.T. Plain Taper Plug	37.20
1/4"-18	A.N.P.T. Plain Taper Plug	41.40
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Net Price Description Pipe Thread Pipe Thread Pipe Thread Plug, L-1 Plug, L-3 Ring 1/2"-14 A.N.P.T. Pipe Thread Plug. A.N.P.T. Pipe Thread Ring A.N.P.T. Pipe Thread Ring A.N.P.T. Pipe Thread Ring -11-1/2 3/8-18 1/2-14 Pipe 3/4-14



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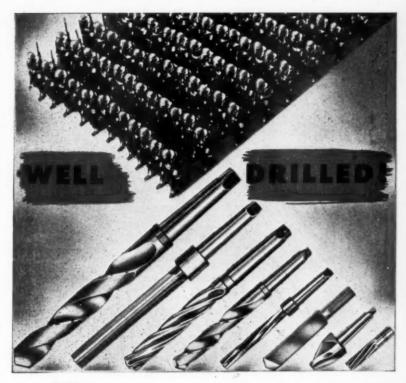
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cost—use Celfor. Celfor means finest tool steel
forged to shape, then twisted hot—to preserve all
the metal, to densify it, to produce tools unexcelled for strength, accuracy and tough durability.



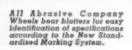
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Grinding Wheels no larger than a grain of wheat. Grinding Wheels as thick through as a man's chest, with a diameter equal to a man's height. Abrasive grains of Borolon and Electrolon ranging from the size of a flour particle to the size of a pebble. Such a range of sizes available in thousands of different combinations of abrasive types, grades, structures and bond types is an indication of the immensity of Abrasive Company manufacturing facilities. And yet with its great floor acreage, its complete equipment, ample laboratories, testing departments and large organization, Abrasive Company is not too large to give

For your normal grinding wheel and other abrasive requirements; for your special needs requiring "custom" service, you may rely upon Abrasive Company quality. Whether from the factory or from distributors' stocks, the Borolon and Electrolon products you buy have been subjected to scientific tests and inspections to insure their accuracy for balance, concentricity and conformity to specification.





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The quick, accurate determination of rotating speeds has become an increasingly important problem and IDEAL has helped in the solution with the IDEAL Electric Tachometer. Effective for checking all shaft and belt speeds. Also equipped with wheel for measuring surface speed in feet per minute. This self-energized tachometer is electrically and mechanically sturdy with rugged, reliable, accurate meter. Two ranges—0 to 2500 RPM and 0 to 5000 RPM. For use as conventional tachometer or for permanent mounting.

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Speed Production



Handle heavier loads—permit deeper cuts at higher speeds because they rotate with the work. The special bearing construction assures accurate turning for precision jobs. Four inserts are easily and quickly interchangeable for centered or uncentered work. Accepted as standard in all leading tool and machine shops.

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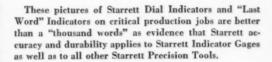


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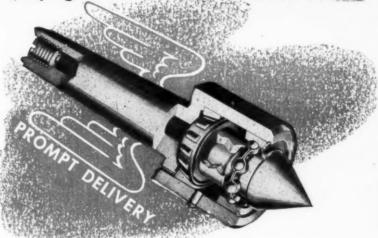
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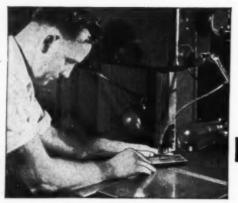
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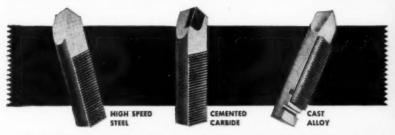
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Jeatured In This Issue

SPECIAL MACHINES of many original types were used in attaining our tremendous potential of fighting machines and weapons. One of the most interesting of these was the eight spindle "Octopus" used in some of the many high precision operations on Allison motors. P. D. Aird describes the machine and tells some of the problems that were solved in its operation in a story commencing on Page ...137

CARBIDE MILLING of light alloys is the subject of the concluding installment in the series of articles on metal cutting sponsored by Wesson Tool Co.

SPACE SAVING in machine design is the subject of a brief discussion by John E. Hyler. See Page191

POST WAR WORKING CAPITAL is a matter that will concern many plants during the times just ahead. Arthur Roberts analyzes the situation and gives some helpful hints and ideas in the story commencing on Page 234

IF YOU are looking for a specific kind of tool, you will find the new Advertiser's Products Index helpful. It lists the different categories of machine tools and tells where to find the different items. See Page 424



TEN popular shapes of Nicholson Rotary Files in an attractive and convenient case!

The Nicholson ROTARIT is a logical sequence to the rapidly widening use of rotary files or "burs," with many workers becoming rotary filing "specialists."

From inherent human pride in good tools, the high-grade mechanic naturally wants his "own" kit of files. It pays—in top-quality work and maximum production. Therefore, Nicholson offers a choice of three popular ROTAKIT assortments:

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For ROTAKIT, or any individual assortments, contact your mill-supply house. Or, WRITE FOR CATALOG,

GENERAL PRICE LIST, ROTAKIT PRICE LIST.

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Glass front (for visibility) and convenient hinged stand feature the handsome wood-case Nicholson ROTAKIT.



U.S.A.



AS THE EDITOR SEES IT



PERHAPS it may be expecting too much, but it seems from the sidelines that what is needed in the present strike situation is more of the spirit of the Golden Rule.

Too much emphasis has been placed on the "take" with too little appreciation of the spirit of giving.

Labor wants to "take" more money home. That's understandable—but there has been no mention of anything that labor is willing to give in return.

Labor's attitude would have been more sympathetically received by the general public if the demand for more money had been tied-in with an offer to step-up the production of goods.

Nobody could quarrel with labor if the ultimatum for a 30 per cent pay increase had been coupled with a corresponding offer to increase production. It isn't the American way to "take" without giving something in return.

Plants that have had equitable pay incentive systems have had no

strike troubles, and are not likely to have anything of the kind.

Right now, management is struggling with other serious reconversion problems. It has no means of knowing what 1946 profits will be, if any. Pinched by rigid ceiling prices, and harried by material and equipment shortages, management has plenty to worry about.

The main hope of increasing profits in the year to come lies in more efficient and increased production. But first of all, it is necessary to get reconversion under way and to get ready to deliver some of the myriads of things American consumers are waiting to buy, with money in their pockets.

What is really needed is a stronger spirit of co-operation between labor and management, with a definite understanding that labor will get an equitable share of the profits when production is under way full swing and there are some profits to divide. Demanding the profits before there are any is too much like killing the goose that laid the golden eggs.

- Wesley G. Paulson -

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HANDLEVER BED TURRET for 9" or 10" lathes speeds production of precision parts requiring up to six operations.



SCREW FEED DOUBLE TOOL CROSS SLIDE for 16" lathes has both manual and power cross feeds. Equipped with large, graduated feed dial.



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4-WAY TURRET TOOL BLOCK permits use of four cutting tools which simplifies tooling for work requiring several successive operations.



South Bend Lathe Attachments increase the capacity of South Bend Lathes for performing a still wider variety of operations. They simplify difficult set-ups, save time, and often eliminate need for special fixtures.

Write today for Catalog 77 which illustrates and describes the complete line of South Bend Lathe Attachments and Accessories.

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Statement of Position—

Until the present tight steel situation is eased, there will be an unbalanced condition in all steel stocks.

There are three principal reasons for this:

- Labor and coal shortages are currently lowering steel production.
- Every industry is anxious to get on with reconversion and peacetime production.
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Ryerson stocks, largest in the nation, reflect current conditions. And because of the great load, it is not always possible to supply the desired steel or deliver available steel as quickly as usual. But we are doing everything we can to satisfy every customer's requirements.

When a certain kind or size of steel is not immediately available, every effort is made to suggest satisfactory alternates which buyers may use with confidence.

Ryerson's 103 years of experience in maintaining large and complete

stocks and working closely with all industries, makes the recommendations of Ryerson metallurgists and engineers particularly practical and helpful.

We thank our customers for their courtesy and patience, for the confidence they have placed in our judgment when alternates for wanted steels have had to be offered, and for understanding our position.

Ryerson will continue to serve you to the best of its ability from its eleven strategically located plants. Stocks will be brought to normal as quickly as possible. This means that Ryerson will be among the first to have more complete stocks of present scarce steels—that Ryerson will continue to be the largest stock source for steel in the country.

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President
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RYERSON STEEL

Steel-Service Plants at: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland,
Pittsburgh, Philadelphia, Buffalo, New York, Boston

THE ALLISON OCTOPUS

By P. D. AIRD

F the thousands of case histories recorded in connection with precision manufacture at wartime levels, that of the Allison "Octopus" remains outstanding even now when steady performance is accepted as a routine miracle.

The "Octopus" is the nickname given by Allison engineers to a special ninespindle boring machine, developed expressly for use in the machining of necessary drive housings for the Allison V-1710 aircraft engine.

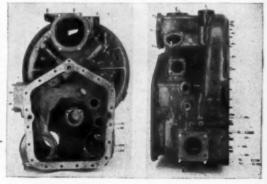
No octopus, no matter how many tentacles it possessed, could have provided more problems to be solved than did the nine-spindle boring machine which Allison engineers designed. It was built by W. F. and John Barnes Co. (Rockford, Ill.) and at first it seemed that it did everything wrong. That the problems were solved is a tribute to the persistance and ingenuity of everyone connected with the operation.

It might be well to consider the place the drive housing occupies in the pro-

duction of Allison engines. Here, as everywhere else in the design of the engine and the planes in which it operates, engineers have had to work wonders with fractions of inches. Every dimension that could be reduced without sacrifice of efficiency of performance has been reduced. Every bit of space has been utilized to its fullest extent so that the performance ratio of the finished plane would remain high. And tho it was necessary that the drive housing provide absolute protection for a great many important functional parts, it too was subject to the most searching and critical consideration.

This meant that after the rough dimensions of the housing had been reduced to the limit, the machining would have to observe even stricter limits. And these tolerances would have to apply on every one of the nine operations necessary to make the housing acceptable for the succeeding operations and in final assembly.

Fig. 1.—This is a face and a side view of the accessory drive housing for the Allison V-1710 engine, which after an enviable record of performance in military applications, faces a new future in peacetime applications. The housing shown here already has been used on an engine. It gives an idea of the magnitude of the job facing the manufacturers in producing this complicated part within the close dimensions demanded by the specifications. (Photos—courtesy Allison Division General Motors Corp.)



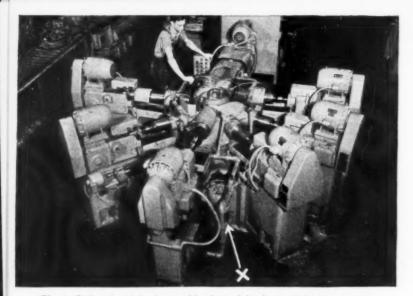


Fig. 2.—Coolant in wholesale quantities is used in the rough boring operation which marks the start of the machining operation on the accessory drive housing for the V-1710 Allison engine. A chip storage opening located across the unit from the operator is accessible to the chip operators while the machine is in operation. The pump is identified by the "X" in the photograph. Note the panel control board.

Originally nine boring machines performed the nine operations. First the nine roughing operations were done on nine separate machines. Then after some rough bored stock had been accumulated, tools were changed and the finish boring operations were performed.

In changing the work from machine to machine and in the setting up of the rough boring and finishing operations, tremendous difficulties were encountered. It was then that Allison engineers began development of an idea—that a special machine, if it could be built to do the job, would release the nine original boring machines for other work.

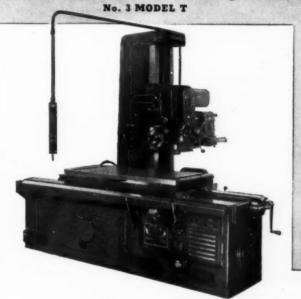
In addition it was believed that such a machine would also release additional expensive tooling and would make it easier for the company to meet ever-increasing production schedules.

The machine was designed, built and delivered but it was several months before the bugs were taken out of it and the operation itself. The operation is now and has been for months routine but there were times when it was almost touch-and-go.

The machine was the first to be used in the Allison plant that was both electrically and hydraulically controlled. That meant almost special training of an operator, even for tool tryout.

Also the wiring for the electrical and hydraulic controls had in some way become crossed when the machine was assembled. Since the rate of approach and cutting travel of each unit in the Unnouncing the KEARNEY & TRECKER Milwaukee

Precision Milling and Boring Machine



Precision Milling plus Precision Boring - performed in one setting of the workpiece —results in greater accuracy in the finished product. That is the contribution this machine offers to economical production of parts requiring precision milling and boring operations,

Developed by Kearney & Trecker engineers to provide a faster and more accurate method of highly precise milling and boring in one setup, the Kearney & Trecker Precision Milling and Boring Machine embodies these basic features:

- Precise machine alignments and measuring devices to assure highly accurate results.
 A No. 50 National Standard spindle nose that accommodatesmodernmilling and boring tools.
- · A wide range of speeds and feeds are available for the efficient use of modern cutting tools on a wide variety of operations.
- · Centralized boring head controls, dual table controls and a swivel control pendant provide for easy and rapid operation.

Again Kearney & Trecker engineers have proven their skill in the design and proportioning of this machine tool. Constructed on the unit plan this machine is characterized by its rigidity - ease of operation - and precise results. Write for descriptive catalog No. T10.



BUILDERS OF MILWAUKEE ROTARY HEAD MILLING MACHINE • MIDGETMILL • SPEEDMILL • FACE MILL GRINDER • AUTOMETRIC BORING MACHINE.

Kearney & Trecker

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Subsidiary of Kearney & Trecker Corporation

machine was different, the situation was really involved. In the case of the spindles, proper adjustment had to be maintained to keep them from colliding and damaging the tools.

Another troublesome problem which had to be overcome was that presented by the outer sleeves of the ball bearing tool shanks or spindles. Each sleeve which encloses the boring spindle rotates slowly as the tool advances. This rotating motion is the result of having the spindle set with just enough resistance to cause the sleeves to rotate as the forward movement of the spindle unit takes place.

This problem, it was discovered, was one of lubrication. After the proper lubricant was found it was necessary to install a forced lubricating system with lubricant lines to spindle sleeve bearings. The forced lubricating pump supplied oil to the sleeves and sleeve

bearings at a slow rate, and excess oil fell into drip pans located under the end of each tool shank quill housing.

Another difficulty that caused trouble was encountered in the lubrication of the sleeves. It was caused by the cutting oil used as the coolant in the roughing operation. In order to reduce the fire hazard in the first machining operations on magnesium, cutting oil made up of 75 per cent Diesel fuel oil and 25 per cent light lubricating oil was used.

In the rough boring operation, the cutting oil with small particles of magnesium cuttings splashed over the sleeves and caused them to bind. Soluble oil made up of 20 parts water and one part soluble oil eliminated this obstacle but, before the soluble oil was introduced, it was necessary to clean the cutting oil and chips from the sleeves after boring each part and

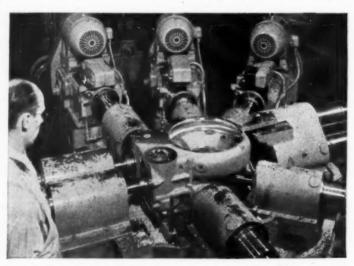
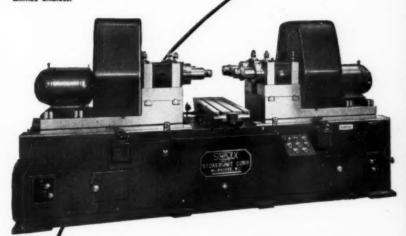


Fig. 3.—Here the finish boring machine is shown in operation. The work has been brought within rough tolerances in a preliminary operation and now, positively located is undergoing the final boring operations which will make it available for the rigid inspection tests which the part must meet before being passed to assembly.

Increasing wage rates of today make necessary new methods of reducing costs. At medium production rates, this becomes difficult with general purpose machine tools. Simple multiple tooling and fixtures, indexing from roughing to finishing position, offer a new cost reduction method. Tooling costs are low—job possibilities endless.

SIMPLEX



This photograph shows a SIMPLEX 4U 2-way Precision Boring Machine equipped with four #4 spindles, and a hydraulically indexed stiding table operating between adjustable positive stops. On the sifeting base a single work holding fixture is mounted providing for operating on the work from both ends. After the roughing operation is completed on both ends, the table is indexed to the

finishing position, the finishing operations are performed on both ends simultaneously and the completed job is ready to remove from the fixture to change to the next job. The fixture and tools are removed and retained intact, ready for a quick set-up when the job is ogain run. The automotic cycle relieves the operator and helps maintain predetermined production schedules.

Precision Boring Machines

STOKERUNIT CORPORATION

SIMPLEX Machine Tools Division

4530 West Mitchell Street, Milwaukee 14, Wisconsin
Precision Boring Machines, Planer Type Milling Machines and Special Machine Tools

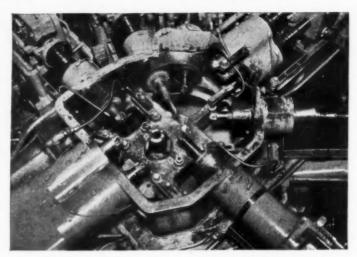


Fig. 4—Here is a closeup of the fixture on the rough boring machine as seen by the operator. The tools have been advanced to cutting position. This view gives a comprehensive idea of the magnitude of the operation necessary to produce the accessory housings of the V-1710 engine.

brush lubricant on them after every second part was bored.

For some reason just enough heat was generated by the tools to be transmitted thru the boring bars and the ball bearing tool shanks to the rim of the central fixture in which the tool shank sleeves were mounted. This heat caused some distortion of the fixture, so that holes in the casting would sometimes be bored out of location. Apparently the change brought about in lubricating the sleeve bearing and the change in coolant corrected this along with other difficulties.

Tho the first machine built had the capacity to meet the current Army Air Forces requirements, increased demands made necessary the construction of a second machine. Accordingly a machine incorporating some minor changes was built and installed to do the finishing operation.

Operational records of the second machine with its refinements make the engineers feel that it is even more accurate and has greater flexibility in adjusting for hole location. Also in the finish operation, it was not necessary to use coolant, thereby eliminating the lubrication system necessary in the rough boring machine.

The machines are of the horizontal unit type, mounted on a base arranged with one central section and various wing sections to support seven units and a fixture. The center section is arranged for the collection and storage of coolant and chips in the rough boring machine.

The seven self-contained square ram drilling units, with the exception of those with the double ball bearing tool shanks, are each driven by 2 hp power motors. The double ball bearing tool



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COOLEY ELECTRIC MANUFACTURING CORP.

36 South Shelby Street Indianapolis 7, Indiana Export Department, 1111 S. Ferry Building, New York 4, New York shank units are each powered by 3-horse power motors.

Each unit's motor drives the boring drive mechanism (T in Figure 3) with a double V belt and gears. The hydraulic pumps are driven with single belts.

Two of the units are equipped with two spindle boring heads with alloy steel spindles mounted in anti-friction bearings and driven by alloy steel gears. Sleeve type spindles equipped with anti-friction bearings are closely fitted into hardened steel bushings mounted in the rim of the fixture. With these sleeves, guides for the tool are eliminated other than the guide that is obtained from the long sleeve type bars.

All units operate in a cycle of rapid approach, feed, dwell (if required), rapid return and stop. Each spindle has its individual control button. Where coolant is required in the operation, coolant controls are operated before "start" buttons are activated.

Each unit can be operated individually, a factor of convenience and importance for set-up and tool tryout. Also spindle travel may be interrupted in its advance if a sleeve should bind during the regular operation cycle. If this happens, a pilot light in the upper right hand corner of the control box lights up.

A special cycle timing device prevents collisions between two adjacent boring bars for the camshaft and magneto holes. The operating cycle for one spindle is started automatically, only after the other is near enough thru boring so that it will kick out before the second one gets within 1½" of the point of intersection. An electro-limit switch controls this feature.

The fixture is manually operated. The work is located on the face and by two dowels. Five clamps, four of which clamp on the lower flange of the casting, hold the work in place. It is common practice to run 1,200 castings before changing tools. The cutting time increases slightly as the tools become dull because of the hydraulis pressure that is maintained in the feed mechanism as the spindles advance.

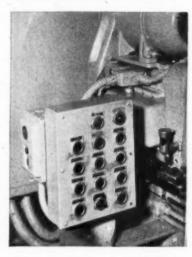


Fig. 5—Complete control of each spindle in the "octopus" operation is provided by this control box. There is an individual control on each spindle and in addition provision for all-over control of the machine through the use of the "emergency stop", "emergency return" and "cycle" switches.

Mikro-Lok boring bars are used on the finish operation machine. These are widely used and should be well known by any industry using machine tools for precision work. The cutting tools are tungsten carbide tipped and of conventional design except for the Mikro-Lok feature.

The boring bar for the tachometer drive holes extends out $11\frac{1}{8}$ " in boring the second tachometer hole (.6865½ .0005" Dia.) and bores slightly out of round. This might be due partly to the slow speed of the tool (330 rpm) and the lack of sufficient rigidity in the long

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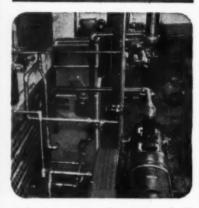


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AIR ENGINEERING EQUIPMENT

An idea of the complexity of the task performed by the Allison "Octopus" in the manufacture of V-1710 airplane engines is provided by the detailed chart given on the preceding page. Spindle speeds, speeds in surface feet, feeds and depths of cuts are included with other pertinent facts.

boring bar of the diameter that is used. In order to correct this condition and obtain the required finish, the hole is hand reamed by the operator after he removes the casting from the machine.

Approximately ½ pound of magnesium is machined from the casting in the rough boring operation. Approximately 1/16" of material is removed from the bores in the finish operation.

The heaviest machining is done in the roughing operation while boring the magneto hole. Here the length of the cut is 4.893" in removing .140" of magnesium at 410 rpm.

The machining limits of the first, or rough boring machine are shown on the Individual Spindle Data chart.

Some difficulty was encountered on the rough boring machine for reasons previously given in trying to maintain the limits of .0005" plus or minus required in the finishing operation.

The machine used for the finish operation maintains these finish limits without difficulty with but one exception. That is the finish boring of the tachometer drive hole as previously stated.

The machine for the finish operation was constructed to bore to the mean dimensions as closely as possible and maintain the fine finish that was required. It was recognized that hole size limits would be maintained by the tools and tool adjustment. For this reason the spindle housings were mounted on the base.

To eliminate any misalignment caused by vibration, each machine is bolted to a 48" thick concrete foundation.



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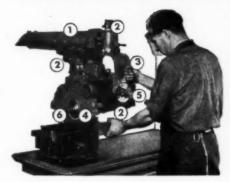
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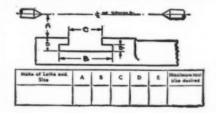
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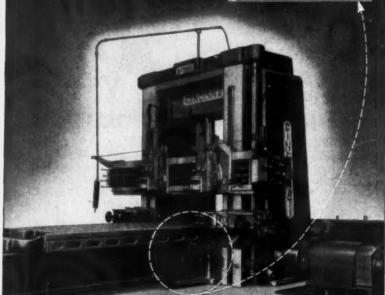
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PART XII-CARBIDE MILLING OF THE LIGHT ALLOYS

(Technical Data, Courtesy Research Dept., Wesson Tool Co., Detroit)

THE Carbide Milling of the Light Alloys such as Magnesium and Aluminum presents entirely different problems from those encountered in the machining of the ferrous materials and their derivatives. The first of these concerns the machine; the second, the cutter and the third the material and its finishes. These will be considered in the course of this discussion, in connection with a series of actual shop operations representing production jobs in the aircraft industry.

Since these materials are milled at extremely high spindle speeds, both horse-power and the durability of bearings concern the designer of machine tools applied to the milling of these lighter alloys that are destined to be more and more widely used. The design problems will not be discussed from the designers' standpoint. Rather, they will be considered in the light of the solutions arrived at by wartime industry, which, in turn, may serve as a guide to future development.

Spindle speeds ranging from 3,000 to 10,000 apparently are desirable for the milling of these materials. With an 8" diameter cutter (an average size) the surface foot rate can easily reach 20,000 or more feet per minute. under these conditions, and with the customary design used for machines in the engineering and manufacturing sectors, the no load horsepower is comparatively high. Thus at 6,000 rpm, a bed type machine equipped with an 8" cutter has a no load horsepower



Fig. 1—Set-up for machining the magnesium part shown in Fig. 2. An air-operated fixture speeds handling.

er expenditure of 11 of the 25 with which it is powered. The power available for actual cutting, unless a large motor is installed, will be proportionately small. The woodworking industry, acquainted with high spindle speeds for the past three or four decades is concerned with a problem that on the surface appears similar but in reality is entirely different. The cutting pressures in woodworking are relatively low, even as compared with those necessary in the machining of the lighter alloys. High spindle speeds in combination with relatively low unit bearing pressures are the source of few difficulties. But high spindle speeds in combination with high cutting pressures, as in the machining of these alloys, may be the source of much difficulty.

In the early days of increasing war manufacturing activities, standard bed type machines were modified with high speed motors direct connected to the spindles, with cycle changers interposed between the bus bars and the motors for speed control. In the beginning of these experiments and attempts at suitable manufacturing schedules, spindle speeds as high as 15,000 were attempted. Bearing troubles were so frequent and disastrous that these speeds were quickly restricted to a maximum of 10,000 rpm.

Even under these modified conditions it was necessary to water-cool the bearings and thermostatically control the temperature of the coolant. The use of maximum spindle speed of 6,000 rpm was the final compromise. Machines are now available with this rpm rating that are

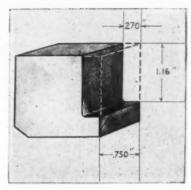


Fig. 2—Details of the magnesium part shown in the process of machining in Fig. 1.

guaranteed to give quite satisfactory performance.

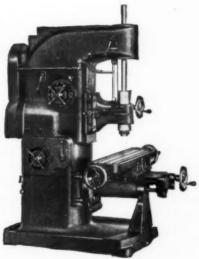
These high surface foot rates are necessarily considered for the milling of the lighter alloys when carbide is the cutting material. And since the advantages of carbide are so numerous, the disadvantages of machine design as mentioned are not only not considered as unsurmountable, but have been turned over



Fig. 3—Here is an interesting chamfering operation on the part shown in Fig. 4. Two 45° carbide tipped chamfering cutters are used.

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squarely to the machine tool designers. Whether higher spindle speeds than the final compromise of 6,000 maximum will be demanded by daring production personnel who insist upon the use of carbide with its many advantages is a part of future machine tool design and development. It will be interesting to consider some typical milling operations performed with carbide cutters at extremely high spindle speeds.

The cutter presents a minor part of the difficulties involved in these machining operations, Carbide life is extremely high and cutting angles are not critical; i.e., they may vary considerably with little change in the final results. The clearance angles are, however, extremely critical and must be on the face a minimum of 15°. Anything less than this results in marred finishes. While the surface indication from a micro-inch standpoint may be extremely good the appearance is cloudy. And this in the aircraft industry is objectionable for very good reasons. The same may very well be true of peacetime manufacturing operations.

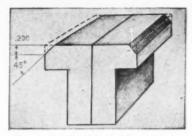


Fig. 4—Details and dimensions of the workpiece being machined in Fig. 3.

In the early days of these attempts to mill the tougher Durals and those even more difficult relatively, machine cutter bodies were generally fashioned out of boiler plate or Meehanite. Later developments, about which there will be a full discussion in another issue of this publication, make use of alloy steels.

The 14 ST and the 24 ST types of Dural materials are considered more difficult to machine. The former has a relatively



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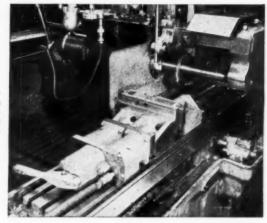
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Fig. 5—Set-up for an unusual slotting operation on the piece shown in Fig. 6. Spindle speed is 10,000 rpm and cutter is 8" in diameter.



high silicon content and its abrasive effect on carbide tips or blades is more pronounced than the latter. However, both the aluminum and magnesium alloys are, when compared with the ferrous materials, relatively simple to machine.





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Figs. 1 and 2 represent the machining of a magnesium component. The nature of the operation is immediately evident from the perspective with dimensions included.

The bed type machine used for this job has a modified vertical head with a direct connected high rpm motor. In fact, this operation is performed at a surface foot rate of 10,000 fpm. The feed rate is 100" per minute which with a 4" diameter cutter having four teeth represents a chip load of .0025". This load per tooth is considered good practice where relatively high finishes are necessary. The radial and axial rake angles of 20° positive each were subsequently modified to 15°. The cutting edges broke down because of the excessively high shear angle and the abrasive action of the 14 ST material which is specified for this workpiece.

The use of air operated fixtures, as shown in Fig. 1 is not only common practice but quite essential to bring the handling time in proper relation to the drastically reduced cutting time.

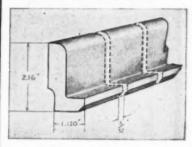


Fig. 6-Dimensions and details of the workpiece being slotted in Fig. 5.

An interesting operation of chamfering is shown in Fig. 3. The workpiece is presented in Fig. 4 with the necessary dimensional data for an appreciation of this operation.

The two 45° chamfering cutters, carbide tipped, brazed to solid bodies are shown in Fig. 3 as set up on the arbor of a No. 3 horizontal knee type milling machine.





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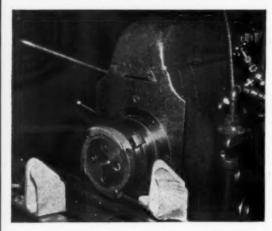


Fig. 7—Milling operation on the ST-14 components shown in the foreground, details and dimensions of which are given in Fig. 8.

This ST 14 material is satisfactorily milled at 1,500 rpm spindle speed and a feed rate of 60° per minute. While this milling job could be performed at much

higher spindle speed and table feeds, the results obtained with standard equipment, as used here, are entirely satisfactory.



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AMERICAN MEASURING INSTRUMENTS CORP. 240 WEST 40th STREET NEW YORK 18, N. Y. An extremely interesting slotting operation is shown in Figs. 5 and 6. The latter presents the dimensional information which makes this operation of unusual interest. It will be noted that the bed type machine is again of the modified type with a spindle speed of 10,000 rpm maximum. The slots as indicated in Fig. 6 are 3/32" wide and are milled in this operation at a curface foot rate of 21,000 fpm. The spindle rpm is 10,000 and the cutter diameter is 8".

The 15 hp motor on this special head has a top speed of 3,000 which can be stepped up to 10,000 by means of a cycle changer. The table feeds this workpiece into the cutter at 200" per minute. Thus the chip load is .0027". The use of air operated fixtures is typical of these high speed milling operations. Such mechanical loading and unloading devices are necessary to bring the handling time into proper agreement with the cutting time. Since the latter has been reduced drastically by these high speeds, it becomes necessary to reduce the time required to handle the workpieces correspondingly.

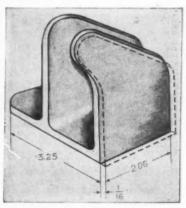


Fig. 8—Details and dimensions of the aircraft component being machined in Fig. 7.

In Figs. 7 and 8 a milling operation on an ST 14 component is clearly shown. In this operation a standard knee type hori-



7 RICHMOND SQUARE, PROVIDENCE 1, R. I. ERICAN

zontal spindle machine is used. High speeds, both spindle and table, are not resorted to for this milling job on an aircraft component. The amount of stock to be removed is clearly indicated in Fig. 8. And the method of holding the workpiece and its relation to the cutter are shown in Fig. 7.

The spindle speed for this operation is 1,500 rpm which with an 8" diameter cutter results in a surface foot rate of approximately 3,200. The table feed is 60" per minute which results in a chip load of .010". This is an unusually high load per tooth for this type of operation but results in satisfactory performance since the surface condition of the milled piece is not critical.

An unusually interesting slitting operation is presented in Figs. 9 and 10. The set-up on a modified high spindle speed bed type machine is shown in Fig. 9. Here again the maximum spindle speed is 10,000 rpm which with 8" diameter cutters results in a surface foot rate of approximately 21,000 fpm. The workpiece,



Fig. 9—An unusually interesting slitting operation on the part shown in Fig. 10. in this instance, ST 14 rods less than ½" in diameter (.410" according to Fig. 10), is pulled thru by hand. It is estimated that the feed rate is in the neighborhood

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of 100" per minute altho obviously this varies considerably during the operation.

This is a climb milling job as indeed it should be. The effect of the downward pressures is to hold these Dural rods firmly in the very simple fixtures that are shown in Fig. 9. Without these cutting pressures assisting in the holding operation, a rather complicated fixture would have been necessary.

This very satisfactory slitting operation is a good example of the possibilities of a carbide application to these lighter alloys.

These illustrations will serve to indicate the nature of, and the possibilities for carbide milling of such light non-ferrous alloys as magnesium and aluminum. The same general approach in milling holds for such materials as asbestos and plastics. Space does not permit considering these in detail. No one has yet discovered the upper limit of spindle speeds for these operations. With customary positive shear angles, carbide tips or blades show no unusual wear with speeds as

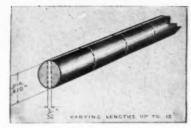


Fig. 10-Details and dimensions of part being machined in Fig. 9.

high as 20,000 to 25,000 sfpm. The feed rate is governed almost entirely by the finishes called for in the specifications.

Whether these extremely high speeds and feeds are practical in every instance from a production standpoint adds up to another consideration. What is important here is the definitely established fact that this carbide age includes not only the ferrous materials but all engineering materials that are machineable and that need to be processed.





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fixture for its second pass through the machine. The three heads, equipped with suitable tooling, perform the following operations on each counterbalance flange: (1) trepan, rough, and finish bore one 3.735" hole; (2) drill, rough and finish counterbore, and finish bore four 1.250"-.9375" holes; (3) drill and redrill one 25%" hole. The parts are automatically transferred down the line of working positions as these operations are performed. Production is eight completed crankshafts per hour. This makes an extremely efficient and accurate machining set-up requiring only one operator to keep it going.

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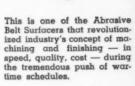
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way



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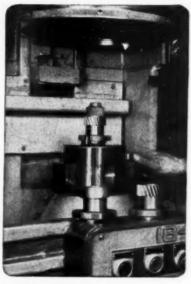
The SHEAR-SPEED will cut a given gear in 1/5 to 1/20 the time required by other processes. Some gears are currently being cut in less than 1/2 minute.

2. Is it a single purpose machine?

No. The SHEAR-SPEED can be changed over (by changing the cutter head) by one man in about 20 minutes to cut another size or pitch of gear.

3. Will it cut both helicals and spurs?

Yes. By changing the work reciprocating guide. Currently, minimum lead recommended is 10".



4. Will it cut splines?

Yes, providing length of spline is less than 3 inches.

5. Are there different models?

Yes. Currently the SHEAR-SPEED comes in three sizes, for maximum gear outside diameters of 3, 5 and 7 inches respectively.

6. What kind of tool life do you get?

This varies with the material being cut. Present indications are that the range is from 10,000 to 25,000 pieces per set of blades.

Do number of teeth affect cutting time?No. Cutting time depends only on face width and depth of tooth.

8. Do you need skilled operators?

No. Machine cycle is completely automatic. Operator merely loads and unloads.

9. How accurate is the SHEAR-SPEED?

Accuracy of product compares favorably with other cutting processes. Correct spacing is built into the cutter head. Correct tooth form is provided in the cutter blades.

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Your Grinding Wheels – Right or Wrong?

By J. F. FISCHER*

In a shop where the same grinding jobs recur frequently, it usually pays to go to considerable effort to select exactly the best wheel for each job by exhaustive shop tests, and to standardize on that wheel so long as the job conditions remain exactly the same.

Such thoro testing is seldom practicable in a job shop, large or small, where the same piece is unlikely to go into production frequently, and where brand new jobs constantly pop up. However, it is entirely possible to make close enough selections even in job shops. But the selection must be based on adequate knowledge of what governs the action of a grinding wheel, how wheels are made, and what the markings mean. Usually the best source of this information, and hence the best guide to correct wheel selection, is the manufacturer who will supply the wheel.

Too often wheels are selected for specific jobs, by the grinding operator or foreman, by more or less rule-of-thumb methods. One common error is to pick a wheel that did well on the same operation on the same piece, but under somewhat different machine conditions. Another mistake is to choose a wheel that was satisfactory on a seemingly similar job, which is, however, slightly different. Still another way to go wrong is to assume that a given marking means exactly the same wheel, no matter which manufacturer produced the wheel.

The errors which result from such unscientific methods of selecting wheels account for a great deal of poor grinding—surface defects, dimensional inaccuracy, too rough finish, low production and excessive wheel wear.

Here are some instances:

In one foundry, small steel castings were ordinarily snagged on floor stand grinders with A16-R5-V2 wheels, 16" x 2" x 1\%" in size.

To take care of increased production it was necessary to install several pedestal grinders using 8" x 1" x ¾" wheels. The snagging room foreman assumed, as a matter of course, that since the job was exactly the same except for the type of machine, the same wheel specifications were indicated.

Within a few hours after the new wheels were put in service the wheel manufacturer received a wire telling him the wheels were "no good." They were unsatisfactory in several ways, chief of which was that they tore the castings. The manufacturer had every confidence that his wheels were all right and that the real trouble was in the way they were being used. So he sent a competent abrasive engineer to the shop.

The trouble was immediately evident. The smaller, thinner wheels, of necessity, had a smaller area of contact with the work than the larger wheels. As a result, each grain of abrasive carried greater pressure and so tended to dig into the work. Also, the wheel was a little too hard in grade, so that the grains were not torn from the bond as quickly as they should have been, which increased the tendency to tear the castings.

^{*}Manager, Sales Engineering, Abrasive Co.



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The abrasive engineer advised that on the pedestal grinders, the 8" wheels should be A24-Q5-V2—two sizes smaller in grit and one degree softer in grade. The finer grit enabled the pressure to be carried by a larger number of grains, thus reducing the pressure on each grain, and the slightly softer grade permitted the grains to be torn out of the bond sooner. Between the two, the tendency of the wheels to tear the castings disappeared.

To give an idea as to how complex wheel action is, let us suppose that instead of snagging, this had been a case of cylindrical grinding, using a large wheel on one machine and a small one on the other, the work piece being the same. The results would have been quite different, due chiefly to the fact that in snagging, the work is held by hand and therefore cannot be fed to the wheel under complete control, as is true in cylindrical grinding. On cylindrical machines that are in good condition the feed, and hence the pressure, is under complete mechanical control.

Under those circumstances, increasing the unit pressure by reducing the area of contact would make a wheel of given specifications act softer than its real grade. As in the snagging example, the grain size would be reduced for the smaller wheel, but for a different reason—namely, to make the wheel act harder. If the grade were changed at all, when changing from a larger to a smaller wheel, it would be to make the smaller one somewhat harder instead of softer as in snagging.

These are typical of many points about wheel action that are well known to abrasive engineers, but not always thoroly understood by operators.

Another reason for wrong wheel selection, often resulting in poor grinding, is that many shops are convinced that their business is so "different" they need special wheels for nearly every job, made to order, instead of taken from the maker's stock.

While wheels may be "special" in many respects, by far the commonest



December, 1945

MACHINE TOOL BLUE BOOK

179



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variation from standard is in grain size—the nominal grain being mixed with other sizes. A common special is to combine the nominal size with a smaller size to obtain better finish, or to make the wheel better able to hold a corner. But there are other ways to get corner-holding ability, without making a special wheel, which are often preferable, as shown by this case:

A shop ordered a WA463-K7-V1 wheel for cutter grinding. In the light of the shop's description of the job it was evident that a standard wheel, WA46, would perform to better advantage. But since it was necessary that a thin edge be maintained on this dish wheel-which was the reason for specifying a combination grit-a denser structure wheel was advised, which would accomplish the same result, while retaining the advantages of the standard grit. The shop accepted the recommendation and later admitted that the 5-structure did everything expected from the special grit in 7-struc-

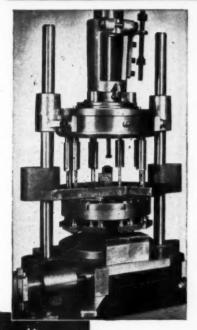
Merely because the material of the work piece is identical does not mean that the same wheel specification can be used to best advantage. That was the reason, however, why a shop ordered several WA361-J8-V1 wheels, fortunately, however, accompanying the order with detailed information about the job. The 361, of course, indicates a special grit combination.

Order records showed that the shop had been using this wheel specification for a surface grinding job. The new wheels were for cylindrical grinding on the same piece. For various reasons, chiefly the difference in area of contact, the special wheel was needed for the surface grinding, but a standard WA36-J8-V1 would be better for the cylindrical grinding. This was explained to the customer. With some misgivings he agreed to try them, and then reported that the standard wheels performed perfectly satisfactorily.

Until recently, nearly every wheel manufacturer had his own private

NOW-

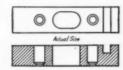
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Above: Close-up of the Drilling Head Bushing Plate and Indexing Fixture Unit with Quill Clamp.

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method of marking wheel specifications. This caused much confusion, especially when a user changed from one maker of wheels to another.

Today all wheel makers have adopted the system of Standard Markings for Identifying Grinding Wheels which was worked out and adopted by the Grinding Wheel Manufacturers Ass'n in 1944.

But, helpful as is this uniform marking, identical markings do not necessarily indicate exactly the same wheel, as between different manufacturers. The system is a standard of markings only—not a standard of grinding action. Thus, one wheel maker's "R" grade might act like another's "Q" or "S" grade. Similar differences may exist in density or structure, so that one manufacturer's 5 structure may be either denser or more open than another's 5.

Finally it cannot be assumed safely that a nominal grit size will mean exactly the same to all wheel makers. As in making up special wheels, some manufacturers have decided that a certain combination grit gives such superior results as to finish, accuracy and ability of the wheel to stand up that they have made some combinations standard. As a matter of fact, the standard, or nominal grain sizes of most manufacturers are actually combinations. But they are not all the same. Thus, to make a standard, or nominal 46 grit wheel, one manufacturer may use half 46 and the other half a finer size. Another's 46 may be made of one-third 46 and a third each of coarser and finer numbers. Other wheel makers have different methods of combining sizes to make their nominal sizes.

This is not a false marking—it is simply the manufacturer's method of making standard wheels which they have found to have wide application in doing the best possible job, of some type, under certain conditions. But it shows plainly why it is not always safe to assume that because a 46 grit wheel of one make did a fine job, the same marking of another make will exactly reproduce the results. As a mat-



with full engineering service, has open capacity to help you with your produc-tion problems. Our plant is geared to render a three-fold service.

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ter of fact, so seldom is the nominal grit of a wheel an exact description of the grit used, that a wheel that is, say, 46 grain only, would be a "special" with some wheel manufacturers and might be described with another digit following the nominal size.

Next to actually testing a wheel on the specific job it is to do under shop conditions, the best way to select wheel specifications for a new job, or when buying a different make of wheel, is to get the advice and recommendations of the wheel manufacturer's abrasive engineers. This usually can be done satisfactorily by correspondence. As much detailed information as possible should be given about the job on which the wheel will be used, including all of these points:

Wheel dimensions;

Type of material to be ground;

Size and shape of work;

Wheel speed;

Work speed, traverse and in-feed;

Area of contact;

Make, type and condition of grinding machine;

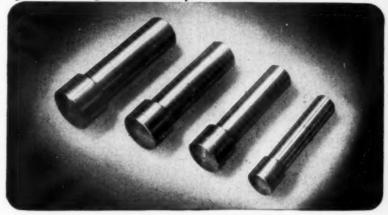
Whether grinding is to be done wet or dry;

Rate and amount of stock removal; Surface qualities required.

With this information, an abrasive engineer can usually specify the wheel that will do the job to best advantage, and usually he will be able to do so without resource to special wheels.

On unusual jobs or those which present special difficulties—as did many of those encountered in armament production—it usually pays to have an engineer of the wheel manufacturer study the job under actual shop conditions. Sometimes he will spot the cause of trouble in some seemingly trivial fault—which may have nothing whatever to do with the wheel being used. Many a grinding trouble that has been blamed on the wheel has thus been traced to worn center points, dirty center holes,

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- Prevent marring of finished stock end during feed.
- Permit greater uniformity in length of feed.
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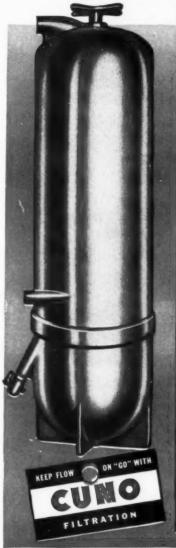
a poorly maintained machine as regards spindle bearings and ways, vibration from nearby machines, backlash in gears, or improper use of coolant or dressing tools. These are not rare conditions, in even well managed shops,

For the general run of work, a goodaltho usually not exact-guide to wheel selection are tables of wheel recommendations such as are published by many wheel manufacturers. These are based on wide experience in many shops with wheel sizes that are most commonly uesd, performing on machines of the type most often employed. Under ordinary conditions, these tables are useful for picking a wheel that will come close to that which will be found to give the best results. But it should be evident from what has been stressed in this article, that the table to use should be that published by the manufacturer who is going to furnish the wheel. Also, it should be remembered that these recommendations are subject to local conditions such as skill of the operator and condition of the machine. Usually however, a wheel of the specifications given by one of these tables for a specific job will be so close to the right one that a little skillful manipulation of speeds and feeds by the operator will change the action of the wheel enough to give exactly the desired results.

How to manipulate a wheel in this way, to change its normal action, will be described in a subsequent article of this series.

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To fill the need for an accurate, parallel angle vise, the Lucas-Milhaupt Engineering Co., Cudahy, Wisc., has developed a new magnetic vise providing accuracy to 1 minute of arc thru a range of 180°. The vise is magnetically held and clamped, and parallelism is maintained in one place while angular adjustments are made in a vertical plane.

Base of the vise consists of copper and steel laminations permanently fused into a solid unit, in which a semi-circular recess is machined to receive the rotating work-holder. The steel work holder, being semi-circular in shape, is machined to fit the recess in the base permitting it to rotate 180° with respect to the base. Set screws hold the object to be ground securely in the vise.



In operation, the vise is set to the desired grinding angle by means of calibrations, verniered to within 10 minutes. The entire unit is placed upon a magnetic chuck. When the current is applied the vise becomes rigidly set at grinding angle. Angular changes can be made in a matter of seconds.

According to the makers, the vise assures longitudinal parallelism to .0005°; is extremely simple to set; remains set thruout the grinding operation; develops no slack or wear; is sufficiently low and small to eliminate interference with the grinder, and permits a greater variety of operations without machine adjustments. The vise is built in two sizes to meet most normal requirements.

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Saving Space In Machine Design

By JOHN E. HYLER

OT infrequently, a designer will discover that on a particular machine, space-saving considerations are highly important. In fact, there are times when the conservation of a bit of space here and there, will make it possible to include points in machine design that will add greatly to the value of the mechanism. There are places, for instance, where it is highly important to hold down the overall size of bearing housings to the lowest possible point, so that some machine part may function over or past them readily, and without interference. To hold down the size of a bearing housing, one must hold down the size of the bearing itself as to outside diameter. It pays to remember that experienced ball bearing and roller bearing manufacturers have progressed far

along this line of endeavor, and that one can obtain either ball or roller bearings that have very small outside diameters in relation to the bores. One line of bearings that has been noticed, may be had in any bore from 1/6" up to 21", adaptable for problems of the type cited.

Sometimes, the need for space saving will be longitudinal rather than radial, and in such cases, the elimination of every element on a shaft or spindle that can possibly be spared is a point in strategy. For instance, consider a shaft called upon to do duty which will impose end thrust upon it, and the first natural inclination of the designer is to incorporate such thrust bearings as will protect against end play and inefficiency. Later, however, he discovers that he is badly in need of



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the space a thrust bearing would require, and that right at the place where it would logically be installed. The shaft is gear driven. He had expected to use spur gears. Then he remembers that herringbone gears will not only do the job smoothly, but will also absorb such axial thrust as will be generated in the shaft, making it possible to get along without the thrust bearings he had expected to use. There are firms making herringbone gears for every imaginable type of service, so that even if the shop where the designer is located is not equipped for cutting herringbone gears, he can safely include them in his design.

A great deal of space is often saved by the judicious application of friction clutches, especially those of the expanding-ring type, designed on the principle of mechanically expanding a ring within a friction cup. The use of such clutches as built-in parts of a machine is of growing importance with reference to convenience and spacesaving. Double-clutch layouts of this kind may be used for driving a given shaft in either direction, or for driving at two different speeds in the same direction, the latter being especially convenient in cases where two different feeding speeds are needed on some feeding mechanism. Any shaft carrying up to 10 horsepower or more may well be driven by a clutch of this kind.

Even where a belt drive from a line-shaft or a countershaft is run to a machine, the use of a friction clutch on the lineshaft or countershaft will save the space that must otherwise be taken up by a loose pulley at the machine, and by some sort of belt shifting mechanism, in addition. In such installations, the pulley at the lineshaft is attached to the loose sleeve of the friction clutch, and the clutch body is either clamped or keyed to the shaft.

Such clutches may also be used for machine brakes where brakes are required, and take up less space than brakes of various other kinds. A double clutch is sometimes used for this duty, by the simple expedient of keying one of the friction cups to the machine frame, thereby making it stationary.



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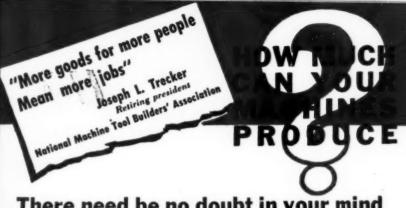
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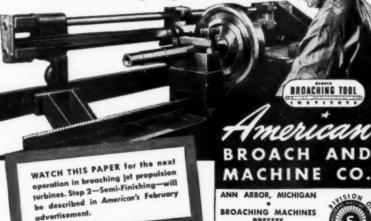
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PRESSES BROACHING TOOLS SPECIAL MACHINERY

of the slots already cut with the first broach. The result of these three cuts is illustrated by the silhouette above.



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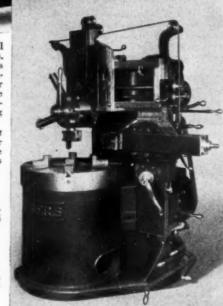
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FLAT DIE FORGING In Modern Hydraulic Presses

By C. W. HINMAN, Designing Engineer

WHEN a blacksmith hammers a red hot iron on his anvil and reduces the work thickness evenly with a flatter, the area of the piece becomes enlarged, and the work produced is a flat forging. Today, we have powerful hydraulic forging machines that perform the same operation on very large pieces of steel and it is done in less time than a blacksmith could think of doing it.

In a flat forging die, as its name implies, the work is forged between the faces of a flat upper and lower die. Roughly, the forging may be round, square, or of polygonical shapes. Forging alters the mechanical structure of metals; the atoms become rearranged in a more homogeneous manner in the piece, and wear, strength and machinability are considerably improved.

A typical example of flat forgings made in a modern all-hydraulic press, is shown in Fig. 1. Here are three steel gear blank rings which have been flattened in a 500-ton all-hydraulic H-P-M forging press. The flat sides are parallel and the blanks are ready for machining.

Prior to the recent development of this press, flat die forgings were usually made in steam-hydraulic presses. These forging presses use steam and air pressures as sources of power. However, with all their necessary auxiliary equipment, they occupy too much floor space, and most of their accessories are expensive. Beside the press itself, it is necessary to include a steam pressure boiler, air compressor, steam hydraulic intensifier, water storage tank, a water softener, and a complex system of piping.

The new H-P-M all-hydraulic forging press, with its simplified air-hydraulic operating system, is rapidly becoming a standard production machine for doing all types of flat die forging. The press speed, the tons pressure applied on the work, and the ram movements, are all under control of a single hand lever.



Fig. 1—These three gear blank rings of alloyed steel are typical examples of flat die forgings made in a 500-ton all-hydraulic press.

The press closes rapidly by gravity, and the main cylinder is filled with oil during the closing movement. This is accomplished by the automatic action of a patented prefill valve. These three features permit high-speed closing, and the pressure stroke follows automatically with no appreciable time lag.



Fig. 2—A 1,000-ton all-hydraulic flat die forging press in operation. One man handles the hot billet with the 6,000 lb capacity autofloor-type manipulator. The heating furnaces are seen in the rear.

Basically, the design of the all-hydraulic and steam-hydraulic presses are similar. A most noticeable exception is that a number of modern operating features have been incorporated in the all-hydraulic press. Among these are the prefill valve for the main cylinder, and the single hand-lever control for speeds and pressures, mentioned previously.

The initial cost of the all-hydraulic press, based on floor space, as compared with the steam-hydraulic press of equal capacity, is considerably in favor of the all-hydraulic type. The all-hydraulic press needs but one foundation, while the other press needs two, one for the press and another for a boiler, intensifier, and water tanks. Further: the all-hydraulic press reduces maintenance costs practically to the vanishing point. There are no expensive packings to replace, and no complex piping upkeep.

HOW IT OPERATES

Fig. 2 shows an installation of a 1,000-ton capacity all-hydraulic flat die forging press in a large Mid-Western metal working plant. The auto-type-manipulator is handled by one man. He is able to position the hot billet in any desired lateral position, or to turn it oyer in

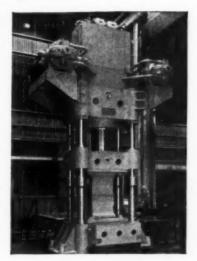


Fig. 3.—A 1,000-ton self-contained all-hydraulic press designed for flat die forging operations. This press has a maximum ram travel of 42°, and a maximum pressure can be obtained anywhere within the limits of this travel. The press is equipped with two radial piston type, hydraulic pressure generators, each driven by a 200 hp electric motor.



FERTURE Do. 4

THE **avey** Type ma-6 AVEY-MATIC POWER FEED HAND FEED AND REVERSING **MOTOR TAPPING MACHINE**

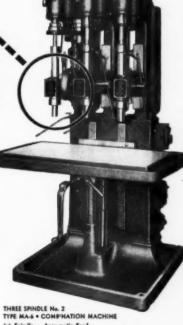
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> Type MA-6 is made in following capacities: No. 2 — 1/4" capacity in cast iron. No. 3 — 1/4" capacity in cast iron.

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Fig. 4—A typical flat die forging produced with a 500-ton all-hydraulic forging press.

either direction by revolving the jaws that grip the billet, as seen in front of the machines. All movements of the manipulator are under control of four hand-levers. The foreman beside the machine is watching progress of the work, and gives necessary orders on how to manipulate the billet in order to complete the job.

At rear of the manipulator are the heating furnaces. It is necessary to have two or more furnaces to supply the press continuously with hot billets. In addition to simple heating of the billets, there is an additional time required for "soaking", or holding the material at

Fig. 5—A series of photographs illustrating how a 12" diameter steel ring is flat forged from a length of round billet. This is an example of small work which can be performed with a 500-ton all-hydraulic press.



furnace temperature long enough to cause the desired metallurgical changes in the material. A soaking heat insures that the billet to be forged is evenly heated, and of forgeable consistency thruout the material. If the billet becomes too cool while being forged, it is immediately withdrawn from the dies and placed in the soaking heat. At the same time, another billet of the right temperature is transferred from the soaking heat of the furnace to the press.

A 1,000-TON PRESS

Fig. 3 shows a 1,000-ton capacity self-contained all-hydraulic flat die forging press. The illustration shows the press under construction, but nearing completion. This press is a prototype of the one shown installed in the preceding illustration. The large supporting base shown in Fig. 3 will rest on a concrete foundation, and is under the floor line in the plant where the press is installed. The man sitting at the right gives a comparable idea of the size of this machine.

This open forging press is equipped with motor driven hydraulic pumps which are directly piped to the press cylinder, and uses the Fastraverse principle of press operation, which provides for prefilling and exhaust of the main cylinder during the rapid traverse movements of the ram. Direct com-





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munication is provided between the overhead oil tank and the main cylinder thru a valve built into the cylinder head.

FLAT DIE FORGING CYLINDRICAL WORK

Fig. 4 shows a large steel forging made from a round billet in a 500-ton capacity all-hydraulic press. Handling this operation in the press, slowly revolving the work while forging it approximately round, is taken care of by a manipulator. After forging one round shaft next to the center shoulder, the work is returned to the furnace for reheating and soaking, and is then turned end for end to forge the opposite shoulder. This is only one of many examples of forging a long piece of cylindrical work in flat dies.

The flat die forging of a steel disk and finishing it into a ring in two following operations, is illustrated in Fig. 5. The first operation (at the left) squeezes the heated section of a round billet into a flat forging (having rounded edges) by hydraulic pressure between the anvil and a flat die on the ram of the press. The forging is then returned to the furnace for reheating and, in the center view, is being forged on its edge while being turned slowly by the operator. The press stroke is adjusted to keep an evenly closed height between the upper die on the ram and the anvil.

In the third view, after reheating the forging, the center hole is cut thru by using a die block hardie and a suitable

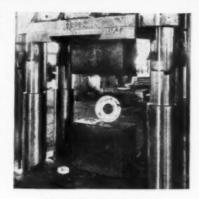


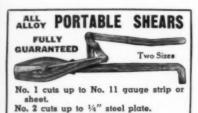
Fig. 5-(See preceding page.)

punch. The edge of the ring is finished by turning it slowly between the anvil and several Fastraverse movements of the ram.

(Photos-Courtesy The Hydraulic Press Mfg. Co.)



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rect peripheral speed, increase production, obtain maximum usable life from grinding wheels. Sizes: 10" 3-speed 1 H.P. to 30" 4-speed 30 H.P.

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2486 RIVER ROAD

2 New ALCO Tools



SPRING SCREW
THREADING DIE HOLDER

Since this Alco Roller Stop was first introduced, we have received hundreds of letters complimenting us on our engineering foresight in furnishing a stop which serves a dual purpose. Used as a stop, it revolves with the work so that the end of the work is not marred and on delicate work, one finishing operation can be saved. There is no friction between the stop and the work such as occurs when a stationary stop is used. There is no oil splash when the work hits the stop and the concentric alignment feature in this Alco tool centers the stop on the work exactly.

The same tool, when equipped with special inserts, serves as a revolving support for long pieces or where very accurate forming operations call for absolute rigidity. Supports are made to fit the contour of the work and are easily and quickly inserted in the holder. This tool can be changed from a revolving support to a revolving stop and vice versa in just a few minutes.

The Alco Spring Screw Threading Die Holder opens new fields where the very accurate spring die can be used. To those operators who know the accuracy of work delivered by the spring die versus the acorn or button die, this new holder for the spring die will eliminate all the "bugs" which previously had to be overcome. In the spring die, the cutting edges are exactly parallel with the shank diameter so that regardless of the depth of cut, each tooth does the same amount of work, The Alco Spring Screw Threading Die Holder, with its flanges for controlling concentric alignment, keeps the die exactly centered on the work so that not only are perfect threads cut but dies last longer because of

To those operators who have avoided using spring dies because of the seemingly insurmountable mechanical difficulties encountered in trying to hold the die in alignment with the work, we predict a real thrill in the excellence of work produced when these dies are hold in this new tool.

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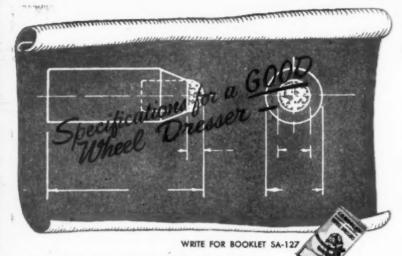
We wish to express our appreciation to our long list of clients and triends, who in the past half century have contributed to our success and ability in carrying forward the development of Hi-Duty Marking Tools and Machinery, which today, enjoys world wide recognition.

As we enter into peace time operations, we find ourselves on the threshold of a great tuture. The challenge of tomorrow is heard today. Research is the very root of progress, the old must give way to new, as superior advantages are established by modern science and industry. As we enter into this future, we should not find it too unfamiliar, for we have paid strict attention to the past and present. Our production will increase with our mechanical readjustments, and our distribution will rise or fall on our human relations.

One thing has not changed – our friendship: we can conceive no new formula for making friends, we hope to hold our friendship of the past fifty years, through appreciation and reciprocation. As we look forward to the future years of progress, we greet our new friends with the same earnestness, sincerity, and intention.



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Automatic Welding Hastened Atomic Bomb Development

N OW that V-J day is recorded in the pages of history, the cloak of secrecy is gradually being lifted on some of the significant developments that made this memorable date possible.

While many factors were involved in the ultimate defeat of Japan, it is generally agreed that the atomic bomb was the instrument which brought quick and unconditional surrender.

An interesting sidelight on development of this powerful new weapon was revealed by the report that fabrication of vital equipment necessary for manufacture of atomic bombs was hastened by about 30 days due to advantages of "Lincolnweld" automatic arc welding, a process introduced and perfected by The Lincoln Electric Co., Cleveland, Ohio.

Thru this comparatively new method of welded construction, it was possible to build certain large and extremely important tank units that were instrumental in production of atomic bombs approximately a month sooner than could have been done otherwise.

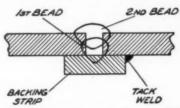


Fig. 1—Cross-sectional sketch of typical joint in the tank structure showing relative position of backing strip and weld penetration.

In this instance the unique design of the tanks required a fabricating procedure that would render the structures absolutely leak-proof and air-tight since their purpose was to receive and store dangerous emanations or residual matter that remained after scientific atom-harnessing operations.



Fig. 2—General view of tractor type Automatic welding unit used in production of atomic bomb equipment.

Since manual shielded arc welding had been used with pronounced success for production of many types of structures, this medium was first tried but without success. The peculiar formation of the large, cup-shaped bottom design of the tanks defied effective joining with the electric arc and the plates frequently became buckled and distorted. This was partially due to the fact that certain proven controls for distortion in arc welding could not be utilized as the tanks were fabricated inside a heavy concrete form at job-site.

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At one of the three closely guarded atomic bomb plants, a series of 12 tanks, 75 feet in diameter and approximately 15 feet in height, were erected. These units were supplemented by 4 smaller tanks 16 feet in diameter.

The metal fabricated part of the tank comprised a shell and bottom section fused into a single cup-shaped container. In addition to solid welded metal structure surrounded by a heavy concrete structure all around, the tanks were buried deeply in the earth as a further precaution against harmful radioactive emanations.



Fig. 3—Another view of the tractor showing deposition of flux on joint ahead of arc.

As allowable distortion of the structure was less than one percent, and all joints were required to pass rigid X-ray examination for possible porosity or other defects.

The mild steel sheets, some of which were formed to effect the cup shape of the bottom section, were arranged in position against the concrete backing and manual arc welding was first attempted to join the seams. While this procedure proved satisfactory where fit-up was

HIGH SPEED STUD DRIVING THE NEW WAY

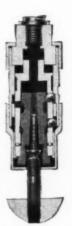
A FAST OPERATION TIMED IN SECONDS

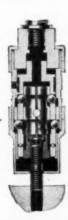
Tool prior to loading.

Tool with igws locked in full reg-ister on the stud by upper balls, but without lower driving balls in positive driving position.

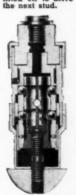
Tool in positive driving position with driving balls pulling jaws up into taper nose bushing. Stud is partially driven to depth.

Stud is driven to proper depth and drive balls are again in free position, but with jaws still locked in full register as in figure 2. The jaws open up when the tool is lifted off to drive









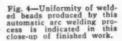
The TITAN No. 100 SERIES AUTOMATIC SELF-OPENING STUD DRIVER is the only tool of its kind to incorporate an automatic take-up for wear on the jaws. As the threads in the jaw become worn, the action of the driving balls on the jaw drive shoulder tends to pull the jaws up in the taper nose bushing, causing them to close in on the stud. The illustrations show clearly how the jaws are locked in full register, how the tool comes down and how the cycle reverses.

Another important feature of this stud driver is the inexpensive method by which the clutch can be renewed. This is accomplished simply by pressing the cam ring out of the main ring. reversing it, and pressing it back. This gives double wear. In driving shoulder studs, the amount of torque applied should be limited; in

> this case, use the TITAN No. 100 SERIES CONTROLLED DRIVE STUD DRIVER, a tool that has an adjustable over-running clutch so that the stud can be driven to any pre-determined torque.

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Manufactured by TITAN TOOL CO. FAIRVIEW, PENNA.





good, considerable difficulty was encountered in sealing the joints where plate gaps at the joints varied up to about \%" and plate distortion was excessive.

This problem was solved with introduction of the "Lincolnweld" process of automatic metallic arc welding, the use of special holding and positioning devices, and the employment of an effective welding sequence applied to the longitudinal and transverse joints.

The ¼" and 5/16" thick steel sheet sections measuring approximately 6 x 20 feet, were first prepared by tack welding ¼" thick backing strips along one end

and one side of each section so that the strips extended halfway beyond the edge of the plate as indicated in the sketch, Fig. 1.

The sections were then placed in their relative positions in the concrete shell with one sheet overlapping the backing strip tack welded to the adjoining sheet, and held in position by means of concrete blocks measuring about $1 \times 4 \times 10$ feet placed approximately 10° apart on either side of the joint. Further efficiency in fit-up was obtained by utilizing clamping jacks similar to those provided shipyard welders which hold the plates firmly in position while welding.



Aerial view of Clinton Engineer Works at Oak Ridge, Tenn., one of the three plants at which the atomic bomb was produced.

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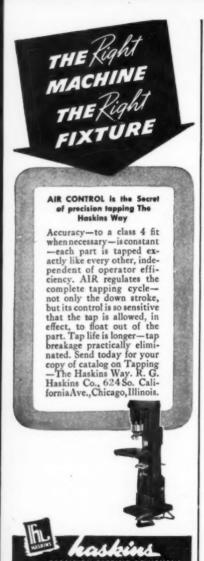


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Before welding the longitudinal joints, ends of the plate sections were first automatically butt welded. Normally two passes of the welding wire effected 100 percent penetration of the joints. The beads were extended slightly beyond the ends of each seam.

The "Lincolnweld" unit, consisting of welding head, wire reel and control box mounted on a motor driven tractor (See Figures 2 and 3) was then positioned for the longitudinal seams, the successive welds starting at the center of the structure and proceeding outward to alternate ends of the plates. Thus, each longitudinal joint was automatically welded, the first sealing beads being applied in a staggered sequence, first right then left of center, the weld penetrating about \%" into the backing strip as shown in the cross-sectional sketch (Fig. 1).

In case of extremely poor fit-up, finish welds were sometimes made in the third or fourth pass of the welding wire in order to completely seal the joint. With a normal fit-up however, only two passes were required.

Finish welds were also started at the center seam, the work progressing in sequence from center to right, then from center to left.

Welding speeds for the first pass were made at the rate of about 36" per minute using 5/32" bare wire electrode with machine set at 650 amperes, 331 volts. For the finish weld the same welding speed and same size wire were used with amperage set at 625 and voltage at 34.

Changes in machine settings were facilitated thru easy accessibility of the controls which were mounted directly on the tractor unit as shown in the accompanying photos.

Fig. 4 is a close-up view of the dense, uniform weld beads as deposited by the automatic arc welding process on a typical section of the tank structure.

In addition to the automatic welding of the main structure, the only additional metal fabrication was in the form of two pipe fittings which were manually welded to the structure.

As a final step in the construction the top of the unit was formed in concrete, thus completely encasing the tank structure with a heavy concrete insulation.



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THE FOREMANSHIP FORUM By Edmund Mottershead

WHO ARE YOUR LISTENERS?

ORE than ever before, the foreman's job today is a job of leadership, a problem of dealing with people. To be effective as a leader, a foreman must be able to say the right thing at the right time . . . to be an effective speaker. Foremost among the problems of the effective speaker, whether to a group or to one person, is the problem of appealing to the listener so that the listener will want to do as the speaker says. The only answer to this problem is a basic understanding of people, especially of the people whom the foreman or supervisor seeks to influence. whether they be workers, other foremen, or top management.

What do you want out of life? Money, fame, power, security? Loyalty of friends, the philosophical satisfaction of a just life? The maintenance of law and order, justice, liberty, happiness? Certainly some of these, perhaps all of them. One thing you may be sure

of:—the people who are your listeners, your fellow workers, want much the same things.

In dealing with people, it is your first task to determine for yourself your own motives and objectives. From the standpoint of expressing your ideas, you have done this when you developed a specific message. Your next and most important task is to determine the objectives and desires of your listeners so that you may understand them and talk to them from their own points of view.

Professor Harry A. Overstreet, in his book, "Influencing Human Behavior," says—"Action springs out of what we fundamentally desire . . . and the best piece of advice which can be given to would-be persuaders, whether in business, in the home . . . in politics, or factory . . . is, first: arouse in the other person an eager want. He who can do



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As the action of the tool is positive and automatic, it can be operated in any position with either air or electrically operated portable tools. It can also be used in a drill press, where it is possible to drill and tap the holes and set the studs in successive operations.

The three simple MODERN steps to speed, economy, and convenience in stud setting are illustrated at the right.

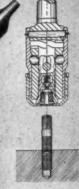
At the top , . . jaws open to take the stud.

Middle . . . driving position, jaws locked on stud.

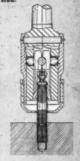
At the bottom . . . stud driven to full depth. The stop collar contacts the work and releases the clutch. Lifting the tool opens the jaws.

The tool revolves in one direction, no reversal, for the complete job.

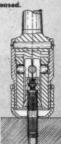
Tool brought to position over study about to begin drive.



Start of the drive, with tool engaged on the



Drive completed, with clutch released.



Write for detailed information on the Modern Stud Setter. You will be interested in how and why it provides a proved means for stepping up your production.

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this has the whole world with him. He who cannot walks a lonely way."

Dale Carnegie says—"If you want to gather honey, don't kick over the bee-hive . . . the only way on earth to influence the other fellow is to talk about what he wants and show him how to get it." To be a leader and get the action you want from people, you have to make them want to do it for you.

What do people want? Few of us are really satisfied with ourselves or with our lives. All of us have strong cravings for certain satisfactions. These cravings or desires are our basic motives. While psychologists differ in listing and classifying these motives, they generally agree on five basic types:— 1—Self preservation; 2—Desire for recognition; 3—Identification; 4—Projection; 5—Rationalization.

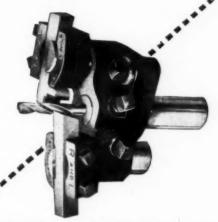
SELF PRESERVATION:-This basic motive is expressed in many ways. Surveys have revealed that the primary interest of the average adult is his or her own personal health and well being ... just let anyone get to talking about himself and that will come out. It is also manifested in one's interest in the health and well being of one's family and friends. It is at the bottom of the sex impulse . . . the desire to live forever transferred to the desire to continue your own life stream in the lives of your children. It lies under the desire for economic security, and as such is the root of most of our economic striving.

Let's supose that I am breaking in a new man on a job. I might say to him—"Bill, we've picked you out to do this job because we thought you were the right man to do it. It's not too difficult, but it offers you an opportunity to show us what sort of stuff you're made of. If you make good on this, you will have all sorts of chances for advancement to better jobs with more pay." What am I appealing to? Bill's desire for economic security . . . self preservation.

DESIRE FOR RECOGNITION:-Psychologists tell us that man developed and



RIGHT---



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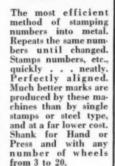
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intelligence thru the ages as he developed means of dominating his environment. The first great step was when he learned to use his hands to manipulate things instead of for walking. The next great step was the development of the power of speech. Then fire, the use of stone, the wheel, the use of metals. Watch any young child, and you will see the process recapitulated. The child is curious. He wants to do things. He demands attention and howls for it when all else fails. Adults are much the same. They want recognition, appreciation, the sense of power and achievement and ability, perhaps even more than they want security.

This desire for recognition shows up in many ways. People like a little pat on the back for good efforts or for good intentions. They like the sense of importance that comes from giving advice or from doing someone else a favor. They want credit for their ideas, for having some intelligence or ability. One of the surest ways to get a listener's close attention and interest in what you are saying is to tell them that you are talking to them about your particular subject because they are the people best fitted to form an opinion and do something about it. By doing this you have given them the credit for having some intelligence and at the same time made them feel important,

IDENTIFICATION:-This is the psychological process of bolstering the ego by identifying yourself mentally and emotionally with other people or groups that you admire and that already have gained the recognition and approval of the society in which you live. The small boy indulges in hero worship, "I'll get my big brother . . .", the point being that he makes himself feel strong and confident because his big brother is larger and stronger and in his mind is identified with himself. You are an American and proud of it, because Americans are wonderful people . and also Americans are wonderful people because you are an American (they must be to satisfy the psychological compulsion).

Model 1R

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The process of identification is represented by "keeping up with the Jonses". All of the "boys" belong to the bowling leauge; so you "belong" too. Every woman conscientiously tries to get herself a crazier hat than the next woman (ask any man); so that she is typically feminine in her individuality. Men as a group tend to stick to the darker and more conservative colors in clothing, because they dislike being conspicuous; yet like to be identified as being well dressed. Identification accounts for our tastes in clothes and food, for our "brand" buying habits, for the group structures in society which are expressed in our thinking as "my country", "my church,"
"my party," "my company", "my department". It is the basis of the team spirit.

PROJECTION:-This is the process of bolstering up the ego by pointing out the faults in everyone else that probably exist in yourself and thus making you feel that you are not so bad after all. It is behind the typical "holier-than thou" attitude. The classic example of projection as a basic psychological force in action is that of the elderly judge who as a youth sowed his wild oats in all directions, but who, as the aged jurist, is the first to see the human frailty in everything and to be suspicious of everything and everybody. It is the process of fattening our own egos at the expense of other people . . . of finding in others the faults which exist in ourselves.

Hitler, denouncing the Versailles Treaty and the international Jewish bankers as the cause of German ills, was appealing to the drive of projection. It is inherent in "buck passing", in blaming others for our own mistakes. It is inherent in the interest we take in the scandals in the tabloid sheets, where the lives and reputations of important people are torn to shreds, making us feel just that more virtuous and important by comparison. Every time some frustrated spinster reads of a divorce in the paper, her ego has a chance to swell in self satisfaction over her own virtue.



THE compactness and portability of the Self-Contained Unit is made possible by the Roto-Clone* with its exclusive feature of combining the functions of exhauster and dust precipitator in a single operation. The Roto-Clone and motor are mounted directly upon the dust hopper which also serves as a housing for the air filter. Filtering the exhaust air eliminates any need for outside duct connections that might limit the mobility of the unit. The dust collected by the Roto-Clone is deposited in a dust drawer to facilitate disposal. Servicing can then consist of installing an empty

dust drawer, and transferring the loaded drawer to a central disposal point. Send for Bulletin No. 275D.

*Registered Trade-Mark for a Dynamic Precipitator or Hydrostatic Battle-Type Wet Collector.

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Automatically opens at a predetermined length of thread.

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Accurate speedy thread cutting is assured with these DIE HEADS. A wide range of capacity of each size die head means a small investment, and makes this modern DIE HEAD the ideal general purpose thread cutting tool. For tough threading jobs where constant uninterrupted operations are essential, the BHICO DIE HEAD will do them.

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B-H INSTRUMENT CO.

Let's suppose that I want to turn over a particularly unpleasant job to a fellow. I say, "Now Jim, I know this job is a tough job and a dirty one, and that's just why I am asking you to do it. Not many of the fellows can do it, and I wouldn't trust most of them to do it right. You know more about it than anyone else and can do it better." How am I appealing to his inner urge of projection? Jim already feels too good for the job I am giving him; so to satisfy his sense of self importance I point out that he is better at it than anyone else. I know he would "duck out" on it if he had a chance; so I mention that I wouldn't trust anyone else but him. He feeds still more important because both he and I confidentially recognize the general inability and untrustworthiness of everyone else for that particular job.

RATIONALIZATION: - Strictly speaking, rationalization ranges from what is popularly meant by the word when it is applied to someone making excuses for accidental or unreasoned conduct to the highly abstract and profound thinking of an Einstein. It is simply the business of making life plausible to one's self . . . of making life "reasonable". It is a process which goes on continually, whether logically accurate or not. Because of this psychological force in people, we must make our actions, statements, and requests seem reasonable to them in the proper light, for otherwise your listeners will find their own explanations and invent their own reasons for your actions.

In making your ideas acceptable to your listeners, appealing to their basic urge to rationalize means that what you say may be fairly well in accord with the things they already believe. What racial or religious or political beliefs have they? What ideas of honor and loyalty and fairness have they? What understanding of "natural laws", of climate, of chemistry, of supply and demand, of machine processes, of materials, have they? What you have to say must be within the limits of their understanding, and your ideas must be



Looks like we're back to normalcy . . . negotiation, re-negotiation, conversion, re-conversion seem to be past history now and so we can say it again . . .

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3829 San Fernando Road Glendale 4, California reasonable in terms of the established pattern of their thinking.

Let us suppose that you have already developed a definite message and are going to present it to a specific audience, whether a group or to one person. You can put that message across only if you can make your listeners want the ideas you have to offer. They will want what you have to offer if it satisfies one or more of their own basic desires. Which desires of your listeners shall you appeal to? Just as an exercise, it will be helpful to jot down under the five headings discussed above the desires and motives of your intended listeners.

What do they want out of life. How is their desire for self preservation expressed in their actions in the plant and on the job? Wherein does their desire for recognition or for a feeling of importance show up in their daily actions? How does the desire for identification make them act? What faults and weaknesses do they have that they cover up by finding the same faults in others? What do they believe already about the subject I am going to speak of so that I can make it reasonable to them? Put down the basic desires of your listeners. and then select the ones to which you can best appeal.

Effective speaking and effective leadership are inextricably bound up together. If as a foreman you look forward to a long future with your company with chances for further advancement, you will want to bring your work and your abilities to the favorable attention of top management. Your ability to handle the people in your department will gain for you this favorable recognition perhaps faster than anything else, and the ability to handle your people hangs upon saying the right thing at the right time.

Remember Harry Overstreet ... "he who can do this ... make people want to do as he says ... has the whole world with him."



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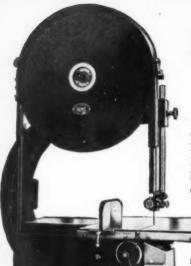
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It contains a complete description of all Moak features, many of which are shown in pictures.

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Port Huron, Michigan

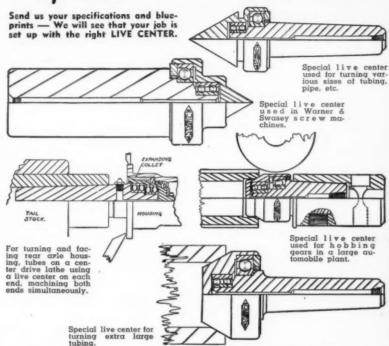
Points To Remember About Moak High Speed Band Saws

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POST-WAR WORKING CAPITAL By ARTHUR ROBERTS

URING the war, labor and materials were easy to convert into cash, modernization outlay was practically nil, hence, the working capital position of many businessmen was 'sweet" at war's end.

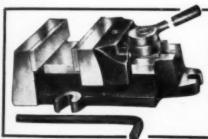
In the postwar period, investments in new equipment and promotions, bigger inventories, higher than prewar costs, and, in all probability, a sizeable increase in sales volume when all restrictions are removed, will put a heavier strain on working capital than it has

been carrying during the war years, so the machine tool user must watch it carefully to have ample funds on hand to meet postwar taxes.

The accompanying tables show you via the easy-eye-way how you can appraise your working capital position and what factors to watch in order to maintain a satisfactory working capital ratio for your business. This operating element is of major importance during 1946, the bridge-over year from war to peace, when taxes will remain comparatively high.

-1.1	76.77	48
anie	No.	- 1

Assets	No. 1 Liabilities		
Cash \$2,500 Receivables 500 Inventory 1,500	Accounts payable \$1,000 Accrued liabilities 500 (including income tax due to date)		
Current assets	Current liabilities\$1,5000		



Current liabilities\$1,500 (1)

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FORGED TOOLS THE BILLINGS & SPENCER CO. HARTFORD 6, CONN., U.S.A.

December, 1945

MACHINE TOOL BLUE BOOK

The excess of current assets over current liabilities is working capital. When working capital is twice current and included in current liabilities.

liabilities, it is usually satisfactory, providing taxes have been accrued to date

Table No 2

Table	NO. 2		
Assets	Liabilities		
Cash \$ 500 Receivables 1,000 Inventory 3,000 (1)	Accounts payable\$1,000 Accrued liabilities		
Current assets\$4,500 Working capital	Current liabilities\$1,500		
Current liabilities \$1.500			

cent of working capital. In normal

Working capital the same as Table times, inventory is usually safest when No. 1, but ratio of inventory to working no more than 50 per cent of working capital is 1 to 1, or inventory is 100 per capital, otherwise, inventory turn is too low.

Table No. 3

2004			
Assets	Liabilities		
Cash\$1,125	Accounts payable\$1,000		
Receivables (2) 2,250			
Inventory (1) 1,125	(including income tax due to date)		
Current assets\$4,500	Current liabilities\$1,500		
Working capital 3,000			
Current liabilities \$1 500			

Same working capital as Table No. 1, but receivables-to-inventory ratio, 2 to

1. indicates poor collections. Ratio more desirable when inventory twice receivables.

T-11- N- 4

Table	No. 4			
Assets	Liabilities			
Cash \$2,000 Receivables 1,000 Inventory 3,000	Accounts payable \$750 Accrued liabilities 250 (including income tax due to date)			
Current assets	Current liabilities\$1,000			
Current liabilities\$1,000 (1)				
Working capital 5 times current lia-	. Table No. 5			

Working capital 5 times current liabilities. Excessive. Too much working capital as bad as too little. "Seed money" must be kept working to harvest profit. Excessive working capital may indicate frozen trading assets (inventory and receivables), which may eventually make it necessary to borrow funds to pay taxes.

Annual sales\$50,000 Working capital 10,000

Turnover of working capital...... 5 Watch the turnover of working capital, which is calculated by dividing the

year-end working capital into the annual sales. When the net profit and sales volume for a period are satisfactory, the working capital turn taken

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Insures accuracy in size duplication. Increases output. Enables operator to retain work size regardless of wheel redressings. Dial indicator registers exact movement of carriage in spite of backlash or other lost motion.





W RITE FOR CATALOG at that time is usually the desirable turn for your business.

Your own experience will fix the most advantageous turn, then try to maintain it.

Table No 6

Working	capital	10,000
Net profit	on sales	2,000

Cash\$1,000 Current assets\$3,000

If current liabilities exceed current assets, you have a floating debt.

Net profit

on working capital20 per cent

Some business concerns use this yardstick. Your own experience figures will fix the most desirable turn. If any deviation therefrom, investigate your working capital set-up.

Table No. 7

Accounts payable	\$1,000
	1,000
(including income	tax due to date)
Loan payable	2,000

				\$4,000 1,000	
	Current	assets			\$3,000

Table No. 8

Current assets	Current liabilities\$ 4,000 (including income tax due to date)
Total assets\$30,000	Fixed liabilities \$5,000 Net worth 21,000

Total liabilities\$30,000

Complete Line

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AT LEFT: Special Carbide Tool Grinder for quickly and accurately sharpening Carbide Tools, 1/2 HP ball-bearing Motor.

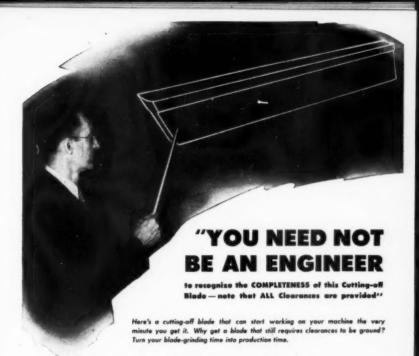
6"x1" wheels. \$110.00

AT RIGHT: Baldor Pedestal Grinder No. 121: 2 HP motor: 12"x2" wheels\$199.00

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Emoire Tool Company manufactures Lurin Palented Curring-Off Blades and Holders under license issued by John Milton Lurin Palents Inc.

We also manufacture Empire Tool Molders and distribute Fastcul line of Centerdrills and Keyseat Cutters and the Rigid Live Centers. Complete catalog sent on request.



8774 GRINNELL AVE. DETROIT 13, MICH. You can have a floating debt but still show a net worth. This has happened to more than one member of this industry, but business is in the safety zone only when the user of machine

tools provides adequate working capital, altho net worth is substantial, and even tho sales are high and net profit is satisfactory.

Table No. 9

		ts	
Total	assets		\$20,000

Working capital \$5,000 before postwar expansion. Machine tool user Jones

	liabilities		
	ng income th		

Total liabilities\$20,000

finds that his business requires this working capital to operate effectively.

Table No. 10

	nt assets	s	
Total	necota	_	\$30,000

 Current liabilities
 \$ 5,000

 (including income tax due to date)
 10,000

 Fixed liabilities
 15,000

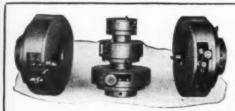
 Net worth
 15,000

Total liabilities\$30,000



Working capital \$5,000 after postwar expansion. Machine tool user Jones' net worth also was the same before and after expansion but fixed assets have doubled. Sizable increase in fixed assets puts a strain on working capital so it should be increased in satisfactory ratio after expansion.

Expansion means additional space or additional working equipment or additional personnel and this increases fixed assets or current liabilities, necessitating a proportionate increase in working capital to keep in the clear financially.



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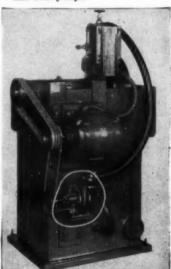
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MACHINE TOOL BLUE BOOK

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DRILLING HARDENED STEELS

By F. G. GEPFERT*

FOUR years ago a new type of drill was developed and put into production for the purpose of drilling hardened steels—steels which could not be drilled with high speed drills. They have been found suitable for drilling carburized, oil-hardened, water-hardened, cyanided and nitrided steels of 40 Rockwell "C" and higher hardness. Use of the "Hardsteel" drill eliminates annealing, re-machining, re-hardening, loss of many hardened parts, time and costly handling. It has been a boon to the war industries of the Allied nations for the

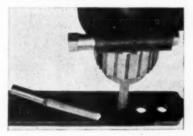


Fig. 1-With a standard "Hardsteel" drill, it is easy to drill right thru an ordinary shop file.

last four years because it has helped speed production of badly needed hardened machined parts requiring drilling, countersinking and counterboring operations.

"Hardsteel" drills differ in shape and material from the conventional and familiar twist drills. The shanks are round but the working parts of the drills are triangular in shape with small grooves at the points to provide chip clearance. The points are ground to the shape of a pyramid with a normal drilling angle of 50° (See Fig. 1). This angle may be changed to suit special countersinking needs. For flat bottom drilling and counterboring, the point may be ground flat (See Fig. 2).

With this drill, cutting action takes place only at the tip. The principle is not one of cutting away metal. Frictional heat at the tip generated by speed and pressure anneals the hardened metal under the drill tip and the drill scrapes out the softened material, leaving a highly burnished surface in the hole. Hole size is held to within one or two thousandths of an inch.

One of the most outstanding applications of the use of "Hardsteel" drills is in the aircraft engine field. In one department of the Buick plant, oil-holes are drilled thru the connecting-rod bearing surfaces of the crankshafts of the Pratt & Whitney duplex engines. Regular automotive procedure involved spot-drilling thru a bushing after carburizing, but before case-hardening. However, it was found that the throws and adjacent parts became distorted to a certain extent, in some instances caus-



Fig. 2—This unretouched photograph shows a block of hardened steel split thru the center to expose the clean cut surface of the holes and the unchanged character of the metal around the holes after drilling, countersinking and counterboring the block with "Hardsteel" drills. Note fracture of block.

^{*}President, Black Industries, Cleveland, Ohio

ing the spot-drilling to form a definite ellinse.

Analysis of this problem led to the conclusion that the cause lay in the breaking of the surface with the spot-drill before hardening. For this reason it was necessary to change the entire drilling procedure, which had been based on former standard automotive manufacturing practice.

The new practice involved the carburzing and case-hardening of the medium carbon high-alloy crankshafts before spot-drilling. The shaft is placed in a specially designed fixture and is then put into position in a drill press, the throws being held in a vertical plane. (See Fig. 3). A 3/a" "Hardsteel" drill with a 60° included angle is then fed into the piece thru a guide bushing. The drill revolves at a speed of 1800 rpm and a hand feed is used. The drill penetrates the piece until the diameter of the hole is about 5/16".

Two spot-drillings are made in line and the fixture is then inverted and two more spot-drillings are made diametrically opposite. The shaft is then realigned in another fixture with the throws in a horizontal plane. (See Fig. 4). A single hole is spot-drilled in the center of each bearing surface at a



Fig. 3—Spot-drilling oil-holes in the hardened steel crankpins of a Pratt & Whitney twin-engine crankshaft, with the throws in a vertical position.

point 90° around the circumference from the other holes.

Next a single spindle drill press is used to bring the diameter of the finished spot to a predetermined size which is checked by gauging. (See Fig. 5).

After the hardened bearing surface has been penetrated by a "Hardsteel"

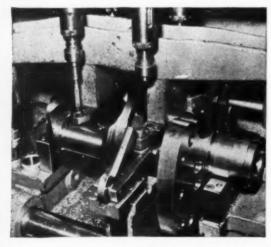


Fig. 4—An operation similar to that shown in Fig. 3, being performed with the crankshaft throws in a horizontal position.





Set-up with six drilling units (two at rear) for drilling seven holes of four sizes in magnesium at rate of seven pieces per minute. The higher rate of feed that is possible with the Govro-Nelson Drilling Unit because of its centrifugal feed principle results in much faster drilling.

By automatically regulating the feed of the drill to protect it against breakage when encountering hard spots in the material, it permits a rate of feed considerably higher than with fixed feed mechanisms.

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drill, a high speed twist drill is used to complete the hole drilling thru the soft core to the hollow center. This operation is done in the same drill press with the same set-up except that a proper size bushing is substituted.

Since the change to this new procedure, after several months there were no rejects from off-position spot-drilling. The parts moved faster to vitally needed aircraft engines and man-hours

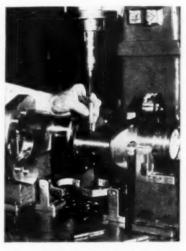


Fig. 5—Gaging the final diameter of the "Spot". Constant checking maintains precision at all points.

formerly spent on prior operations were saved. It is estimated that with the "Hardsteel" drills 40 to 50 spot-drillings were made per grind, with 20 grinds per drill, indicating an extremely low cost per drilling.

Another striking example is reported from the Packard plant where Rolls Royce aircraft engines were manufactured, involving the drilling and reaming of camshafts of SAE 4620 steel. Original plans called for drilling and reaming before hardening, but the hardening process created distortion in the piece, and necessitated a long and costly



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- Resharpening confined to one face.
- Down time for regrinding reduced.
- Unskilled help can use tools without loss of efficiency.

Send for catalog that shows all sizes and prices. Ask for No. H-1139 for super high speed tools and for No. H-398 for carbide tipped tools.



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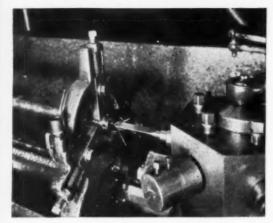


Fig. 6—Close-up view of "Hardsteel" triangularshaped drill used to start hole in hardened end of Rolls-Royce camshaft.

straightening operation after hardening.

By the use of "Hardsteel" drills it was possible to drill and ream after hardening, eliminating the distortion and subsequent straightening process. A turret lathe was used for this operation with the piece mounted in the chuck of the machine and held at the other end by a steady-rest. (See Fig. 6). The overall length of the piece was about 36".

A \(^{\text{5}}_{\text{8}}\)" taper shank "Hardsteel" drill was used and mounted in the turret. The piece revolved at a speed of 750 rpm and the drill fed into the end of the work by the automatic feed. (See Fig. 7), A generous flow of soda-water

was the coolant and the drill was applied to a depth of about ¼", which is well below the depth of the hardened surface. The pieces were then rifledrilled and reamed to the desired diameter. No guide bushings were necessary as center holes had been drilled for prior machining operations.

This new method resulted in substantial improvements in the quality of the work and much lower scrap loss. Overall costs were reduced considerably and much larger production was gained.

In addition to these specific cases, thousands of valuable dies, jigs, and fixture parts have been salvaged. Sometimes workmen neglect to drill for a

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"DIE-LESS DUPLICATING" might be described as a new industrial technique made possible by the accuracy, extreme adaptability and ease of operation of DI-ACRO Precision Machines — Shears, Brakes, Benders — especially when used as a continuous, integrated production process.



←1st Stage

Cutting flat material to size and shape for part to be duplicated. The D1-ACRO Shear rapidly resizes and squares material, also makes slits, strips, notches, angle cuts, etc. 3 sizes,—shearing widths 6", 9", 12".



← 2nd Stage

Forming angles, channels or "Vees" from sheared flat material. The D1-ACRO Brake forms any angle from 0° to a maximum of 110°. 3 sizes—folding widths, 6". 12", 18".



← 3rd Stage

Bending sized and formed material to simple, compound or reverse curves of desired radii, The DI-ACRO Bender handles angle, channel, moulding, rod, tubing wire (round, square flat), strip stock and other ductile materials in a remarkably wide range of accurate con-



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The DI-ACRO System of METAL DUPLICATING WITHOUT DIES has proven its adoptability in making parts just as accurately as can be done with dies, to a tolerance of .001" in all duplicated work. The delay of waiting for dies is avoided — deliveries speeded up.

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- Pronounced "DIE-ACK-RO"



O'NEIL-IRWIN MFG. CO.

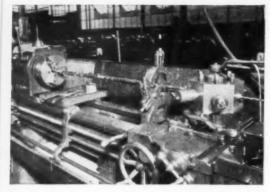


Fig. 7—Drilling the hardened end of a Rolls-Royce camshaft preliminary to rifle-drilling. A speed of 700 rpm is used.

locating pin or miss a drilling operation as laid down in the specifications. Sometimes engineering changes call for a new hole or a change in hole location. These errors and changes are easily handled with "Hardsteel" drills, after the pieces have been finished ground and hardened, which also eliminates the processes of annealing and remachining. A vast amount of saving has been made in this way in manhours and in getting the pieces into the production line for vitally needed materials.

Another valuable application for the metal "Hardsteel" has been found in the



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These cutting tools can be used on any modern machines;—lathes, planers,



Fig. 8—Vertical spinning machine operating at 2000 rpm with "Hardsteel" die spins shut 720 Admiralty Bronze fuse cases every hour.

automatic screw machines, etc., that have sufficient spindle speed to over-come the tool load at increased speeds and feeds. It is equally effective on all types of steel, iron, copper, bronze, brass, aluminum and other metals. Due to the high resistance of these tools to abrasive wear, they do an excellent cutting job on non-ferrous metals.

A specific example can be cited in the case of a plant manufacturing lock nuts for aircraft. This operation was set up on an automatic screw machine. Material used was 21/32" diameter bar

Sanker WRENCHLESS CHUCKS AND VISES



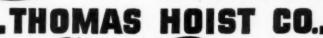
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stock of X-1350 steel. The problem was to meet excessively high production quotas and to eliminate down time for grinding ordinary cutting tools which had been used in this operation previously.

The "Hardsteel" cutting tool used on this operation was 3/8" square, taking a depth of cut of 3/16", the feed being .010" at 1050 rpm. The tools were ground with a side clearance angle of 6°, front clearance angle 6°, side rake 4°, and 0 back rake. This tool was used for the roughing operation and at the speeds and feeds mentioned, this plant pro-duced an average of 2400 pieces per day per machine, requiring only grind per day with "Hardsteel" tools, as against an average of 2 hours per grind with the previously used ordinary cutting tools. With "Hardsteel", production quotas were met with ease.

An excellent cutting job was also accomplished on 7/8" Hex stock of SAE 4130 in the manufacture of fittings for



Fig. 9-"Hardsteel" spinning die used with machine shown in Fig. 8

aircraft. In this operation it was necessary to overcome the violent shock set up by the hexagon shape of the material in addition to the natural difficulties caused by the composition of this particular steel.

Two "Hardsteel" tool bits were used,

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- 1. Positive action
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 Grinds complete form on all types of center

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5. Regrinds old drills into countersinks or

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one ¾" square, and one ½" square, in a Warner & Swasey No. 4 Turret Lathe. With the ¾" bit, a plunge cut was taken to a depth of ½" and with the ½" tool a plunge cut was taken simultaneously to a depth of ¾". The work was turned at 350 rpm and production was increased from 15 pieces per grind to 84 pieces per grind.

Another valuable use has recently been developed in cold spinning dies, particularly when used on non-ferrous metals. Due to the needs of the allied nations for artillery and rocket shell ammunition it was imperative that tools be developed which would out-perform anything else used previously.

"Hardsteel" spinning dies quickly proved themselves in this type of service at a plant manufacturing primex caps for 75 mm artillery shells and rocket shells.

The cold spinning die (see Fig. 9) 1" in diameter by %" high with a .540" cavity was inserted in a holder on the spindle of an ordinary drill press (see Fig. 8). The cap was made of half hard brass which was approximately 4" in length. It was necessary to completely fuse one end of this cap to a depth of approximately ¼". The piece was inserted in an air vise and automatically fed into the die turning at 2000 rpm.

Loading and unloading of this piece was done by hand and no lubricant was used on the die or work. Time per piece was approximately five seconds—2 seconds for spinning and 3 seconds for handling—resulting in a minimum of 720 pieces per hour. And with "Hardsteel" dies it was possible to carry on this operation for 48 hours between grinds whereas with tool steel the best life between grinds was 10 hours.

"Hardsteel" dies gave 15 grinds before becoming too thin for additional operation whereas with tool steel dies a maximum of six grinds per die was obtained. This resulted in far less down time for grinding and an average of 750,000 pieces per die were made as against a total of 125,000 with tool steel dies. 1905



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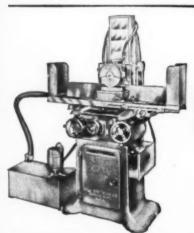
Two drill presses were set up horizontally on either side of this piece, the handle being inserted in a holder while the operation was completed. The roller dies were mounted in a tool holder which, in turn, was inserted in the spindles of the drill presses. Hand feed was used and the spindle speed of the drill press was 2000 rpm.

The problem in this instance was to overcome galling in the dies. This galling condition was so bad with ordinary tools that a maximum of only 1200 to 1500 could be completed before it was necessary to remove the dies either for regrinding or replacement. Due to the high abrasive resistance of "Hardsteel", a minimum of 45,000 pieces was completed per set of dies. This figure was

reached with no regrinding and consequently no loss of time in the completion of very critical parts.

Thru the entire program of using "Hardsteel" tools, one of the outstanding features is the fact that this material can be ground on any type of ordinary grinding wheel—no special equipment being necessary either from a standpoint of grinding wheels or fixtures.

The material, has proved itself in the drilling of hardened materials and the cutting of many hard-to-machine metals. It has served well as tipping material on the work support blades of centerless grinders—as long-lasting material in spinning dies—in accurately-cast rubber molding dies. Wherever ordinary tool steel will not operate at a profit, it is suggested to design engineers that they "Consider the material 'Hardsteel' and let the Research Engineers of Black Industries cooperate, as they are continually doing with others, to help solve your particular problem."



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Spindle speeds with 1800 RPM motor

Feeds per revolution of spindle

Bearing of arm on column Size of main driving motor Height of drill column over gears Working Surface of Base Nat weight

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731"	96"	120"			
431"	48"	46"			
104"	48.00	17"			
91"	10"	91"			
No. 4	No. 4	No. 4			
25.3"	361"	48			
211"	0. 180.	on all models			
(60, 85, 13 (425, 560,	#60,				
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(.010" .020	10"	18"			
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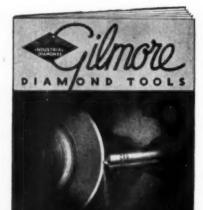
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240	42	.41	.40	.41	.40	.38
1/4		.42	.40	.41	.40	.38
9/32 5/16	43	.42	.40	.41	.40	.38
11/32		.46	.44	.45	.44	.42
3/8	47	.46	.44	.45	.44	.42
13/32	51	.50	.48	.49	.48	.46
7/16		.50	.48	.49	.48	.46
15/32	55	.54	.52	.53	.52	.50
1/2	55	.54	.52	.53	.52	.50
17/32		1.10	.90	1.30	1.10	.90
9/16	. 1.30	1.10	.90	1.30	1.10	.90
19/32	1.30	1.10	.90	1.30	1.10	.90
5/8		1.15	.95	1.40	1.15	.95
21/32		1.15	.95	1.40	1.15	.95
23/32	1.40	1.15	.95	1.40	1.15	.95
23/32		1.15	.95	1.40	1.15	.95
25/32		1.15	.95	1.40	1.15	.95
13/16	1.40	1.15	.95	1.40	1.15	.95
	1.75	1.45	1.20	1.75	1.45	1.20
7/8	1.75	1.45	1.20	1.75	1.45	1.20
29/32	1.75	1.45	1.20	1.75	1.45	1.20
15/16	1.75	1.45	1.20	1.75	1.45	1.20
31/32	1.75	1.45	1.20	1.75	1.45	1.20
1	1.75	1.45	1.20	1.75	1.45 1.45	1.20
1-1/32	. 1.85	1.45	1.20	1.85	1.45	1.20
1-1/16		1.45	1.20	1.85	1.45	1.20
1-3/32		1.45	1.20	1.85	1.45	1.20
1-1/8		1.85	1.40	2.15	1.85	1.40
1-5/32	2.15	1.85	1.40	2.15	1.85	1.40
		1.85	1.40	2.15	1.85	1.40
1-7/32	2.15	1.85	1.40	2.15	1.85	1.40
1-9/32	2.25	1.86	1.42	2.25	1.86	1.42
1-5/16	2.25	1.86	1.42	2.25	1.86	1.42
1-11/32	2.25	1.86	1.42	2.25	1.86	1.42
1-3/8	2.25	1.86	1.42	2.25	1.86	1.42
1-13/32	2.35	1.87	1.43	2.35	1.87	1.43
1-7/16	2.35	1.87	1.43	2.35	1.87	1.43
1-15/32	2.35	1.87	1.43	2.35	1.87	1.43
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The Toolmaker's Set consists of an Empire Live Center with a complete set of points which have been ground on this center. These points are made of tool steel;

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70 SPRING ST.

"ERSATZ" CUTTING TOOLS

E XHAUSTION of Germany's tremendous pre-war stock piles of imported tungsten forced the Nazis to attempt to evolve substitutes for the vital cutting tool metal—tungsten carbide. This was revealed by Harry Crump, Carbide Tool Specialist of the Foreign Economic Administration's Technical Industrial Intelligence Commission, who has returned to the U. S. after a first hand, 3½ month, post V-E Day survey of war time industrial developments in Germany.

Crump, who is Assistant to the Vice President of Carboloy Co., Inc., Detroit, added that of the two major substitutes developed, neither proved as effective as tungsten carbide for machining of metals. Crump pointed out that while use of inferior substitutes was necessary in Germany, U. S. industry was able to obtain all the tungsten carbide tools needed thruout the war. One German substitute, an aluminum carbide-altho extremely hard, gave rather dismal results. In fact, the Germans themselves admitted that tools made from aluminum carbide were "not too good". This "ersatz" carbide could be used effectively only for taking light cuts on non-ferrous metals such as brass and bronze.

Another substitute—somewhat better than aluminum carbide but still inferior to the tungsten product—was a vanadium-titanium carbide containing no tungsten. Altho reports in some quarters mentioned "fairly good" results with this material, production tests with sample tools revealed them to be highly brittle with a tendency to chip easily and to break down when taking anything except light cuts. In addition, Crump stated, a slower and more costly method of processing was apparently found necessary to produce this substitute carbide.

In the manufacture of tool tips from vanadium-titanium carbide, it was apparently necessary to use the hot press method. According to Crump, the hot press method is used in the U.S. mainwhere production quantities are small and the pieces fairly large, due to the fact that it does not lend itself as readily to mass production as does the cold press method used by such producers of carbide tools as Carboloy Co. The hot press method is much slower and inherently more expensive. The vanadium-titanium carbide also gave other troubles. Tools made from it had to be sharpened with extreme care in order that the material would not crack from the heat generated by the grinding operation. Many tools probably were spoiled the first time they were sharpened if operators tried to grind them at the comparatively higher speeds possible when sharpen-

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Sharpens Straight or Angular Flutes
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ARBOR PRESSES FOOT PRESSES SQUARING SHEARS ing tungsten carbide tools. Crump stated that German tool producers admitted to him that they probably would have continued to produce the tungsten-free carbide if supplies of tungsten had become available before the ending of the war.

Even the conservation was carried so far as to reclaim tungsten carbide from the dust of the grinding wheels used to sharpen carbide tools, the tungsten shortage in Germany became so great that other metals were substituted also for part of the cores of their armor piercing projectiles, making only the nose and a short part of the core body out of tungsten carbide. Mr. Crump brought back typical German armor piercing projectiles to compare with U. S. types. Whereas the U. S. projectile is extremely simple in design and easy to produce, the German projectile is composed of many parts, each carefully machined and assembled with many fine screw threads. Workmanship was excellent, according to Crump, but many of the parts were highly finished when there was no need for finishing them at all.

Crump suggested that another reason for the shortage of tungsten carbide tools in Germany may have been the lack of printed instruction material regarding the use, application, and care of these tools. Such information—including slide films—is so much taken for granted in the U. S. that it is difficult to understand why Germany never got around to making information of the same type generally available.

Apparently training on carbide tools was carried out by groups of men who went from one plant to another, giving lectures. This rather slow process of education was further restricted as to effectiveness by the tremendous labor turnover in Germany as a result of widespread use of "displaced" labor. Lack of such training and educational material may have contributed materially to the abnormally high breakage rate on carbide tools. Huge piles of broken carbide tools of all types were noted by Crump in practically every

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BROWN ENGINEERING CO.

126 N. THIRD ST. READING, PA.

major industrial plant. Apparently even the severe penalties which were imposed on workmen for breaking tools were not effective in increasing the average life of carbide tools.

Peculiarly enough, the Germans had not as yet copied the U. S. automatic cold pressing process for producing carbide tips to any great extent, even before starting to run out of tungsten. One of the reasons for this, Crump suggested, was that the Germans had not learned—as U. S. carbide producers had—the technique essential to automatic cold pressing.

In many other ways, however, Crump revealed, German industry American equipment extensively during the last years of the war. At the outset of hostilities, machines and tools used in Germany differed widely in design, speed of operation, and mechanical detail from those in vogue here. At the war's end, many Nazi plants were equipped with what Crump termed "Chinese" copies of American machines and tools. So "authentic" were some of these reproductions that in one instance at least Crump admits he first mistook a copy of a late model American machine for an original.

"It had me stopped for a minute, wondering where they got hold of it," said Crump. "I had to go over and examine it closely before I found out that it was a copy—and a good one, too".

In shop practices, other unmistakable parallels to modern American methods were discovered. For example, German industry apparently used tool speeds and other operating conditions very close to those of American shops in the later war years.

Sizes and shapes of the tungsten carbide tools were almost identical by the war's end to those which had been used earlier in the U. S., Crump declared. The practice of using standardized tools in American industry—to permit mass production of such tools—had also been adopted in Germany.

15 holes in 15 minutes

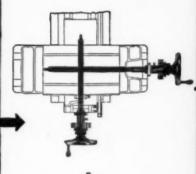
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ASTE Exposition In April

HE American Society of Tool Engineers Exposition will be held in Cleveland, Ohio, April 8 to 12, inclusive, according to an announcement by the Board of Directors of the ASTE at its Semi-Annual meeting in Detroit, Arrangements have been made for use of the Cleveland Public Auditorium and it is planned to use the entire quarter of a million square feet of space thus available.

This will be the fifth such exhibit of production equipment and processes held by the Society and the first major post-war show featuring machine tools. materials handling and control equipment, cutting tools and production processes. The name of the 1946 exhibition was chosen, according to C. V. Briner, President of the Society, because of the expanded influence of the Society in the field of mass production and the broadened scope of such interests. In announcing the show, Mr. Briner said:

"It is high time that the added 'knowhow' which was acquired during war years be studied and re-interpreted in the light of peace-time requirements. That is the job we hope to accomplish with the exhibition in Cleveland and the accompanying technical sessions. The job is a tremendous one, and it will probably be impossible to cover all the many new developments in production processes, equipment, machines and tools on which our new peace-time industry will have to be built. However there is no place in the nation big enough to house all such developments and we will have to do our best in selecting those hundreds of new developments which are most significant to industry as a whole.

This is not a bad time to emphasize what the public may not appreciate. America's peace-time industry is not going to follow the same pattern it did before the war. There is no such thing as "re-conversion". Reconversion means going back. There is no going back for us. Many plants may momentarily put out products closely similar to those we had before the war, and turn them

out in much the same way.

"That, however, is only a temporary condition based on expediency to get production rolling faster and prevent high unemployment. Everybody in industry knows that our products and also our methods have to undergo a complete revamping. Our job as tool engineers is to see to it that this coming revolution in methods and equipment will make it possible to produce better goods at lower cost while industry is paying higher wages to the men who are producing the products.

"That's not an easy job," Briner pointed out, "but it has to be done if our national economy is to continue to expand and our standard of living to rise. This exhibition in Cleveland, we hope, will be a big help to us. We are inviting manufacturers to bring to us the things they have developed so we can study them in the light of

our needs".

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"All attempts to produce this Walkie-Talkie Case by conventional drawing methods failed because the specified critical dimensional tolerances could not be held. When we were asked to tackle the job ow regimeers decided to try a new approach using welding. The cases were stamped from flot sheets and then formed into shape and the folded edges welded. Although this procedure enabled us to hold to required tolerances production with ordinary rods was too expensive. After three weeks of research we were ready to admit defeat when we tried EuterRed 16. That solved our problem!

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I

Sour Talk Shap

REDUCE KNURLING TOOL MAINTENANCE

T is reported that use of small Carboloy pins in place of the conventional steel pins formerly employed to mount knurling tools in their holders has enabled Yale & Towne Mfg. Co., Stamford, Conn., virtually to eliminate tool maintenance on the knurling operation and increasing tool life at least 100 times.

The operation consists of putting a 4" long, medium knurl approximately 1/32" deep on work pieces made of chrome-moly and other tough alloy steels as well as medium carbon steels. With the spindle of the machine stopped (see Fig. 1), the knurl mounted on the cross-slide of a lathe is forced into the

steel work piece approximately 1/32" deep. The lathe spindle is then started—knurling speed being around 150 sfpm, or 187 rpm on a work piece 3" in diameter. The knurling tool is fed 4" across face of the work at .024" per revolution.

This method of initiating the knurl—altho producing an extremely clean knurl—requires a high instantaneous pressure. Altho the pins which held the knurl rolls in place in the knurl holders were made of either high speed steel, SAE 3140, or drill rod, the extremely high starting pressure caused the steel pins to wear rapidly. Usually they lasted on an average of something less than one a day. The knurl rolls picked-up steel from and tore— or "chewed"—the pins so badly that the rolls jammed, sometimes even ruining both tool and work piece, be-



fore the machine could be stopped, resulting in considerable scrap and loss of time for repairs. Actually the full time of one operator was required just to repair damaged knurling tools since average breakage on these tools ran as high as 6 and 8 per day when steel mounting pins were used.

Solid Carboloy standard precision boring bit blanks—7/8" long and ½" in diameter—of Grade 883 Carboloy, which combines high wear resistance with toughness, were used for the pins. Flats were ground on both ends of each pin (see Fig. 2); the pins pressed into place in the knurling tool; and further held in place with set screws that bottomed against the ground flats.

Since the installation of the Carboloy pins in the knurling tools, Yale & Towne Fig. 2—Solid Carboloy cemented carbide pins—with a flat ground on each end for set screws to fit against—have eliminated the trouble, saving on scrap, time and money.



has experienced no trouble with the knurl rolls "chewing" the pins. In fact, the original carbide pins have already run in steady service for more than three months without replacement. This gives a current ratio of life of 100 to 1 over the previously-used alloy steel pins—a ratio which will probably be materially increased when the final life figures become available.

DRILL JIG BUSHINGS

Tool steel tubing, a material used to eliminate the boring operation in the

manufacture of tubular or ring-shaped parts made from tool steel can be used for quick, easy production of drill and liner bushings which are used in drill igs and boring fixtures.

The illustration shows a large drill jig containing 52 holes used for guiding drills. Each hole has a liner bushing which has been cut from a standard sized bar of tool steel tubing. This material is used for bushings of this type, both in cases where small standard bushings are not immediately available, or where bushings of large and unusual sizes are





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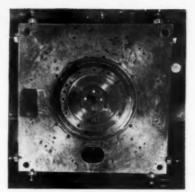


Cutting our can be set to any position in Tee slot of slide. Hardened and ground throughout. Feed screw and worm ground from solid. Gears and feed nut phosphor bronze. Head 3" dia. x 4" long. Wt. 3 lb. Any type shank furnished. Write for complete information.

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Tool steel tubing is made of an oilhardening, non-shrinkable tool steel which is easy to heat treat and non-sensitive in the process. It attains hardnesses in excess of 60 Rockwell C. It can be used for cutting tools of many kinds, for dies, punches, collets, collet closers, spindle thrust collars, lead screw thrust collars, crushing rolls and other hardened rolls of all kinds, ring gages, slitters, spacers, skiving knives, machine tool parts and numerous other hardened parts. By eliminating the expensive process of boring large holes thru solid bars of tool steel, it saves much time, money, labor and steel. For more information, address the Bissett Steel Co., 945 East 67th St., Cleveland 8, Ohio.

GRINDING WHEEL TIPS

"How to BUY Production-Time" is the title of a 24-page, pocket-size booklet describing the qualities and accomplishments of the new Cool-Cut Grinding Wheels produced by Robertson Mfg. Co. Trenton 5, N. J. Described as "a booklet that will tell you things about grinding wheels you never knew before", it is being offered free to manufacturers interested in cutting down production-time in their grinding departments.

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Gives precision tapping without need of lead screws.

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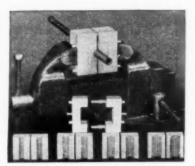
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difficult to hold securely. This device, known as the Nip-Grip, permits fast handling of pipe without damage. It consists of two light alloy retainer blocks in which hardened steel inserts are slipped to hold various pipe sizes. Outfit includes ½, ¼, ¾ and ½" inserts. Springs automatically spread blocks apart when the vise is opened. Work can be positioned horizontally or vertically and blocks are held by pins. The Nip-Grip is manufactured by J. A. Campbell Co., 645 East Wardlow Road, Long Beach 7, Cal.

DESCALING METALS

Culminating years of laboratory research and mill experience, the E. I. Du Pont de Nemours & Co., Wilmington 98, Del., announces a sodium hydride process for descaling metals—in a sense an alkaline pickling bath which requires no electric current.

The process is said to have many advantages over the usual acid pickling for alloy steels and particularly stainless steels. These include a shorter time for descaling, elimination of the possibility of pitting the metal thru careless practice, and saving of 2 to 3 per cent of the steel which may be lost thru action of acid.

The scale, reduced by the sodium hydride dissolved in fused caustic, virtually is blasted from the surface of the metal by generation of steam in a subsequent water quench. Only a few seconds' dip in acid to brighten the surface remains to be done.

The sodium hydride bath is effective on such metals as nickel, cobalt, and copper as well as on alloy and stainless steels.

Nine advantages of the process have been tabulated:

CRUSH DRESSING OF GRINDING WHEELS ... by Perfex

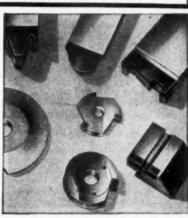
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If you are not already familiar with the story of crush dressing of grinding wheels, we will be glad to answer your questions. Write us today or ask for quotations.



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1—The bath, containing active sodium hydride, penetrates thruout the work and uniformly descales all surfaces;

2—All grades of alloy steels can be descaled and different grades can be descaled interchangeably using the same procedure:

procedure;
3—There is no loss of metal; usually 2 to 3 per cent is lost in other pickling pro-

4-No harm can result from too long treatment; the hydride bath will not pit the work:

5—Since the bath does not attack metal at its working temperature, an ordinary low carbon steel tank can be used;

6-No electric current is necessary; 7-The working temperature of 700°F is sufficiently low that there is no deleterious effect on structure of metal;

8—The hydride bath does not produce hydrogen embrittlement of the steel; 9—Savings in time, space, and disposal of waste residue are important items.

Sodium hydride dissolves in molten caustic and the solution reduces iron oxide to metallic iron. The sodium hydride reacts with the scale to form caustic soda, which is the material comprising the bath itself.

In the first large installation based on laboratory experience, the caustic tank was 4'-10" x 15' x 5'. Six generators to supply the caustic bath continuously with sodium hydride were mounted in the tank along one side. These generators are rectangular boxes open at the bottom and have a cover with feed holes provided with removable caps so that additional sodium bricks may be added. Bottoms of the generators are below the average bath depth. A gas inlet tube passes thru the cover of each box and delivers hydrogen into the generator near the bottom.

Hydrogen is obtained by dissociating ammonia in a standard dissociator. After dehydrating the bath, a concentration of 1.5 per cent sodium hydride is built into it.

A steel water tank located about six feet from the caustic tank is used for quenching the work. Exhausters in the wall above water tank serve as ventilators.

The descaling unit, in the first installation, was in a corner of the pickle room and no additional equipment was required other than that used in the usual pickle house.

Hot rolled rod is suspended on a horizontal rack and submerged in the fused caustic bath for 15 minutes. On removing work and quenching it in the water tank, most of the scale is removed. The remain-

525 Lap Weld seams per HOUR!



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Dual Action
NON-ROTATING CYLINDERS

Lap weld seams on 525 cylindrical containers in one hour!—and quality, uniformity and smoothness of welds improved. "AIRGRIP" Cylinders do four jobs: (1) Clamp the work. (2) Unclamp it. (3) Lock fixtures. (4) Apply welding pressure.

"AIRGRIP" Cylinders have no tie-rods. Ample strength provided by making metal of cylinder walls extra thick —%4 of an inch.

"AIRGRIP" Non-Rotating Cylinders speed production in many ways. Tell us your machine operations. Our engineers will gladly make recommendations.

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"AIRGRIP" Non-Rotating

Cylinders on Resistance

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Resistance Welder Corp., Bay City, Mich. Either end

of the "AIRGRIP" Non-

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* On this welding machine the "AIRGRIP"

Cylinders operate in pairs because two cylindrical

containers are welded

pletely assembled.



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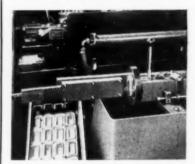
ing reduced material which gives a gray matte appearance to the surface is then quickly removed by a one- to two-minute dip in 10 per cent nitric acid after which the work is washed and dried in the usual manner.

In four years' production, the process required only mechanical improvements.

Later a tank 4'-10" x 28' x 5' was installed to take bars as well as other work. The installation has a capacity for treating 60 tons a day and is used for wire, rod, and bar stock of various grades of stainless steel.

Until now, extension of the process has been restricted because of the critical war need for sodium, particularly in the manufacture of tetraethyl lead for aviation gasoline. Easing of war restrictions makes the process immediately available for general use in the U. S. free of license or royalty.

BREACHING SPEEDS PRODUCTION

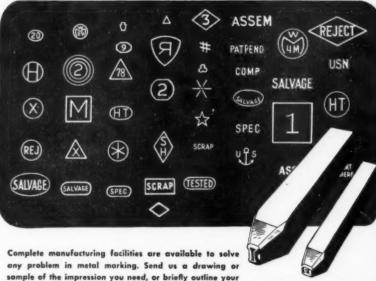


The illustration shows a Zagar Horizontal Broaching Machine broaching a bronze shoe internally. The rectangular hole is about 1" x 2½" x ½" long. The broach was pulled thru and had on it a special guide fixture that would guide the broach on the back end in order to maintain dimensional tolerances between inside of the hole and outside of the bronze casting. The particular feature on this job was in being able to do the job on a production basis without the necessity of using an expensive gear shaper. It was possible to produce an average of 50 pieces an hour with an unskilled operator. Tooling cost was \$530.00 complete, including all experimental time. The alternative method, doing the job on a filing machine, resulted in a net production

lf it's for marking metal Mercury has it ..or can make it?

Whatever your metal marking need may be-for inspection stamps, individual letters and figures, or complete sets for part numbering-Mercury can fill it!

Standard and special inspection stamps like those illustrated, for example, are carried in stock ready for delivery, or can be quickly produced to your requirements if desired.

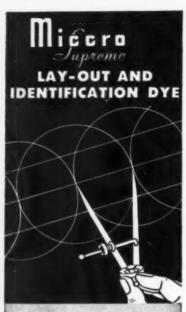


sample of the impression you need, or briefly outline your requirements for a prompt recommenda-

tion, full details are yours for the askingwrite Department B today.

METAL MARKING TOOL SPECIALISTS FOR OVER 25 YEARS

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IN (12) COLORS:

136-Red... 134-Blue... 103-Green 104-Black... 141-Cerise... 137-Violet 138-Tengerine... 139-Chartreuse *142-Purple... 140-Aquamarine 121-Brown... 101-Yellow *Shipped unless otherwise specified...

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Tool, Die, Pattern or Template Layout on Metal.. Quick Identification of Bar Stock, Sheet or Strips, Tools, Dies or Parts.

Dries Instantly - Easily Removed

Circular giving full information and prices sent upon request

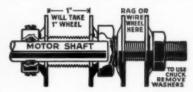
MICHIGAN CHROME & CHEMICAL COMPANY

6340 E. Jefferson Ave. . Detroit 7, Mich.

of approximately 3 pieces per hour with a skilled operator. (Photo-Courtesy Zagar Tool, Inc., 23882 Lakeland Blvd., Cleveland 17, Ohio.)

SUPER COMBINATION ARBOR

A combination attachment arbor for ½" electric motor shafts is announced by A. D. McBurney, 939 W. Sixth St., Los Angeles, Cal. The Super Arbor, No. 150, is designed to take grinding wheels with ¾" holes on main shaft, or ½" holes on the small ends. The extension can be used for rag or wire wheels or for circular saw blades. The extension also holds ½" 24-thread drill chucks which in turn grip drills from No. 60 to those ½" in diameter.



The Super has an advantage over the ordinary arbor in that it fits well over and onto the main motor shaft. A one-inch grinding wheel is thus mounted directly on the main shaft and not out on the arbor extension. This feature reduces the possibility of "whipping" and dangerous disintegration of the grinding wheel.

For those who want an adapter for grinding wheels only, The Super No. 95 has been developed. This enables users to mount grinding wheels directly over motor shafts.

SUNDSTRAND INDEX BASE

A new 8-page bulletin, "How to Increase Production, Improve Accuracy, Eliminate Manual Indexing with a Sundstrand Automatic Index Base" is available. It contains illustrations, description of specific applications, features and engineering data on the Sundstrand Automatic Index Base. Applicable to milling, boring and drilling jobs, this useful fixture helps increase production and improve accuracy. It also reduces operator fatigue. Several typical jobs are illustrated and described.

Copies are available from the Sundstrand Machine Tool Co., 2535-11th St., Rockford, Ill. CIRCLE ® METAL CUTTING TOOLS



CIRCULAR TOOL CO., INC.

PROVIDENCE 5, R. I.

CHICAGO · PHILADELPHIA · NEW YORK · DATTON · CLEVELAND · DETROIT ST. LOUIS · MINNEAPOLIS · LOS ANGELES · ROCHESTER · INDIANAPOLIS

LARGE CARBIDE TOOLS ON TANK PRODUCTION

Among the largest sintered carbide tipped tools ever used on boring mills were for boring cast armor on Army tank

Pictured is one of the Firthite-tipped tools taking a 23/4" wide cut at a 9° angle on inner face of a guard ring for a tank. Despite the heavy interrupted cut, a speed of 71/2 rpm (several times the permissible speed with other tools) was attained. The feed was .011" per revolution.

The special tools were fabricated from the operating company's blue-prints by Firth-Sterling Steel Co., McKeesport, Steel Co., McKeesport, Pa. The Firthite tip is the darker portion of the

shank shown.

Army ordnance officers originally had planned for 650 of these boring mills to meet tank production requirements but capacity of the mills, equipped with sintered carbide tools, so exceeded expectations in turning, facing and boring operations, that only a few more than 400 were required.

Designed by the Consolidated Machine Tool Corp., Rochester, N. Y., the special boring mills were built by six different manufacturers. Sizes were 78", 100" and

112".

FEDERAL GAGING BOOK
A new book, "Over 7,000 Ways to Control Dimensions", has been released by
Federal Products Corp., 1144 Eddy St.,
Providence 1, R. I. It is designed for desk or pocket use and contains 52 pages, list-



ing well over 100 representative Dial Indicating Gages which meet practically every inspection need involving dimensional control.

The setups featured also suggest many other gaging possibilities to meet special mechanical needs. Not only are the Gages themselves pictured, but how they function is clearly and graphically illustrated by detailed diagrammatic sketches which show precisely the gaging "know how" in each particular case.

There are practical Dial Indicator Gage for Angle- Compressibility-Concentricity - Curvature - Depth -Height— Inside and Outside Diameters— Length— Location— Squareness— Thickness— Threads— Width and also various combinations of dimensions. Federal Air and Electronic Gages are also described

in detail.

PRESTO! Your Bench or Engine Lathe BECOMES A TURRET LATHE

Several sizes for converting up to 24" swing. For forming, roughing, boring, drilling, tapping, finishing, etc. without stopping lathe or changing tools.

Send for catalog of Dividing Heads, Belt Sanders, Swing Grinders, Turret Attachments, etc.

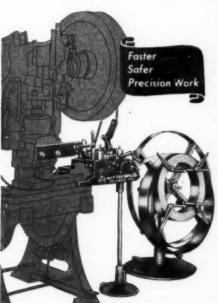


JEFFERSON MACHINE TOOL CO., 700 W. Fourth St., Cincinnati 3, Ohio

Planning Peacetime Production Using Coiled Strip Stock?

Equip with WITTEK

Automatic Roll Feeds and Reel Stands



Wittek Roll Feeds are being used extensively by war plants in their large volume production of high quality metal stampings. The flexibility of Wittek Roll Feeds will assist these plants in their peacetime conversion through their adaptability to various jobs. Keen competition will demand the utilization of equipment to its point of highest efficiency. If your postwar plans include punch press production of parts from coiled strip stock—investigate now the many possibilities of Wittek Roll Feeds and Reel Stands.

Write for catalog, prices and recommendations

WITTEK

4305-15 West 24th Pince, Chicago 23, 111.

Automatic
ROLL FEEDS AND
REEL STANDS

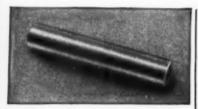
The Gages are arranged in the various major dimensional classifications and the book is indexed and cross referenced. This cross reference allows any type of dimensional measurement given in the book to be easily located. Much practical information useful on new gaging problems is included.

This new book is a particularly timely publication for machine designers, shop superintendents, Dimensional Quality Control (statistical) engineers and production men, for it shows many ways for precisely controlling dimensional quality, and cutting inspection costs. The company offers to send a free copy of the book if requested on official letterhead.

CHECKING ANODIZED RIVETS

An electronic device has been developed by Walter H. Bankard, of The Glenn L. Martin Co., Baltimore, Md. It is attached to a standard rivet sorter and has been the means of improving the methods of anodizing rivets, so as to increase output and cut down on man-hours.

The development is a special electronic device of low voltage, with a magnetically operated lever which is energized by completing an electrical circuit be-



DANLY PRECISION DOWEL PINS

STANDARD AND .001 OVERSIZE

Hardened and Precision ground to a tolerance of \pm .0001 of an inch. Available in .001 oversize for repair or renewal work.

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tween the plate and the contact point. As the rivets pass thru the separator, the contact point touches the head of the rivet, and if the rivet does not come up to anodic specifications, a small relay is energized, and the relay throws out the rivet.

The electronic control was designed by Mr. Bankard to meet a specific need. An Industrial Engineering Effectiveness Report called attention to the need for improved methods in anodyzing rivets. The Methods Group picked up this item from the report and made it the subject of study. Mr. Bankard was then assigned the task of developing something by which it would be possible to separate rivets anodyzed according to specifica-tions, without having them sorted by hand, as had hitherto been necessary. His device was developed and has proved highly efficient for the purpose for which it was intended. It is widely applicable in its use, being of value wherever anodyzed rivets are used.

GEAR GRIND PRODUCTS

Gear Grinding Machine Co., Detroit 11, Mich., has released illustrated circulars on two of its specialties. One is the Universal Oscillating Grinder, designed and developed to handle external and internal cylindrical surfaces, internal tapers and external conical surfaces, generated or formed spherical external and internal surfaces, and generated or formed annular surfaces. The other leaflet illustrates the Formsprag, described as the full complement over-running clutch.

In the Old Battle for New Ways

improved materials handling, because so often neglected, probably holds greater promise than any other factor. Production is aptly called "materials in motion"—in machines as well as between them and other departments. This often calls for special shop containers and equipment, built to fit individual needs, because daily pro-

duction costs and efficiency of equipment are paramount considerations.

We make stock as well as special sizes and models, embodying special features to suit individual requirements.

STEEL FACTORY EQUIPMENT DIVISION

Cleveland Wire Spring Company 5250 BROOKPARK RD. • CLEVELAND 9, OHIO

Original Ideas!

Photo below shows shop trucks built for Soss Mfg. Co., Detroit, replacing conventional "tote boxes". Where, as in this plant, successive operations are numerous, calling for frequent moves of products between machines or departments, this idea has many time-saving advantages.



ASK FOR

Shows user 100 different styles and sizes of shop boxes, barrels, trucks, tool boxes and cabinets, bench legs, drawers, bins, racks, etc.

Cleveland

STOCK STYLES FOR GENERAL UTILITY



TOOL KOTER

A Few Good Reasons Why You Should Protect "Precision" With "Tool Coat"

- "Proven Performance" say many users who have already installed this modern method of pretection for precision, earbide tools, gages and spare parts.
- Cost is negligible compered with previous metheds of rust proofing and wrapping.
- Superior protection against breakage, serrusion and long time storage.
- Simple application with newly developed "Tool Koter," readily portable, weighing only 50 lbs., engineered to meet all your tool coating requirements.
- Low wattage, can be plugged in ordinary socket, all welded steel construction, heavy duty automatie thermostat, thoroughly insulated.
- matie thermostat, theroughly insulated.

 6. Price of "Tool Keter" only \$67.50, includes special heat transfer oil—ready to operate.

If you are already using this method of protection, investigate Seibert's "Tool Coat" for best results—meets all Government specifications. Prompt Delivery.

Write for details. Let us submit recommendations without obligation,

RILEY & GEEHR, INC.

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N, NC. How to

SPOT CHECKING

The necessity for building coin operated machines and record changing players to high precision standards is well known. In order to turn them out in production line quantities, it is necessary to check closely on each machine operation, to keep from having large quantities of rejected parts in final inspection.



In the plant of the J. P. Seeburg Corp., Chicago, spot checking plays an important part in keeping production flowing smoothly and eliminating rejects. Pictured is a spot check on a long shaft hole of the record changing post for the Seeburg Home Recorder, being made by the drill press operator. This part is held to .005" tolerance. Proper spot checking during production keeps down the number of rejects at final inspection, and is found to be an important factor in keeping production at a high level. The gage being used is a Size Control "Go and No-Go" Plug Gage. The extra long, reversible plug adapts it for checking deep holes such as this.

MACHINING AMPCO METAL

How to machine Ampco Metal is discussed fully in Bulletin 66, published by Ampco Metal, Inc., Milwaukee 4, Wis.

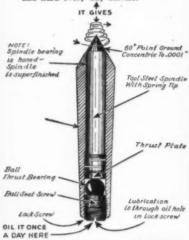
Entitled, "The Machining of Ampco Metal," this 12 page bulletin is well illus-



New

BLUE POINT REVOLVING TIP LATHE CENTERS

Tested and proven in America's greatest machine shops, this new center runs cool in steady production work and hard every day service.



- Runs cool and yields under load to compensate for work expansion
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- No more damaged center holes in work
- Accurate quality construction throughout
- Saves time—saves money saves work
 - Ask your Jobber or Dealer For Full Details

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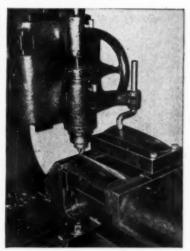
No. 2 MORSE TAPER SHANK

ALSO No. 3 & 4 MORSE TAPER SHANK

PRODUC-TION

ERNEST H. VANDERWALL CO. 538 Polk Street, San Francisco, Calif. trated with diagrams and photographs. It treats fully of the various phases of machining, such as machining practice, gives a table of recommended lathe feeds and speeds, and discusses tool design and inspection. Bulletin 66 is based on practical experience in the Ampco machine shop in machining Ampco metal and aluminum bronze alloys.

MACHINING CONTOURS



The old method of machining blower blades used the same machine as the new method, but, since there was no guide and the operator tried to maintain uniformity by sight, the result was untrue machining and defective work.

The illustration shows a pattern of hardened steel being used. The pattern, which has the same contour as the blower blade, is belted to the movable jaw of the vise that holds the blade being machined. Attached to the head of the machine, is a pointer which follows the contour of the pattern. By bolting the pattern to the vise movable jaw, in the position shown, this same setup can be used for blades of different lengths.

This setup has led to higher quality and increased production.

By W. L. Montooth, Westinghouse Electric Corp., East Pittsburgh, Pa.



Hanson Friction Clutch Type "C" was designed to fill the need of a low price coupling to operate at moderate speeds. Each and every Hanson

Clutch is constructed to do a specific job, and to do it with minimum of trouble and wear. Hanson Clutches consist of units to fit most any installation regardless of how severe the service, both as to load or speed of drive. There probably is a standard Hanson Clutch to fit your needs — if not, our engineers will help you with recommendations. Why not write us today?



ELECTRONIC DRIVES SPEED DRILLING

Motor brackets are drilled and tapped in "jig time" at Reliance Electric & Engineering Co., Cleveland, where the electronic version of the company's own V-S Drive provides adjustable speeds for optimum operation.

Replacing a conventional constant speed motor and 4-speed, belt shift drive, tho operating from the same a-c circuits, the V-S units perform the basic job of providing instant speed selection in a range of from 40-2300 rpm.

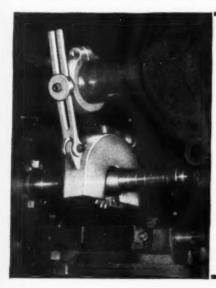
Simple additional control provides (1) a "Drill-Tap" selector

switch, to make the change from any preset drill speed to a lower, pre-set tap speed at the flip of a lever; and (2) limit switches which automatically reverse the tap at high speed when tapping is com-



pleted, for quick withdrawal of the tool from the work-piece.

POR-OS-WAY SEGMENT FOLDER A folder cut in circular form, and des-



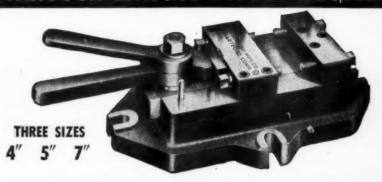
Better Be Safe Than Sorry Equip Your Milling Machines with ROLOWAY CUTTER GUARD

- Protects operator from chips and cutter
- Coolant introduced thru guard
- Guaranteed increased production
 One Minute "set-up"
- Sizes for all millers
- Made of heat-treated aluminum Write for literature and prices SOLD DIRECT

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THE "Stark",

Integral Drive Precision Bench Lathes



Smooth built-in variable drive with perfect speed ranges 156 to 3500 rpm.

No special bench or cabinet.

Dependable for long service on exacting manufacturing, toolroom, die shop, experimental and laboratory work.

Also Standard Open Cone Lathes with complete Attachments in ½", ½", ¾" and 1" capacity.

Records of 20 years continued accuracy are not unusual.

Write to us

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Established 1862

WALTHAM, MASSACHUSETTS

Originators of the American Bench Lathe

ignated as S-1 has been issued by A. P. de Sanno & Son, Phoenixville, Pa. The piece describes the firm's segmental grinding wheels. Besides explaining the merits of this type of grinding wheel, the folder carries illustrations of operating methods, recommended types for special purposes and sizes for standard chucks.

THREAD HARDNESS TESTING



A new application of cemented carbides in the field of hardness testing was recently developed by Pratt & Whitney Aircraft Division of United Aircraft Corp., East Hartford, Conn. For a number of years solid Carboloy balls have been used in Brinell machines, particularly for checking hardness in higher ranges. For this purpose, the extreme hardness of cemented carbides has insured greater accuracy of hardness determinations.

In the Aircraft application, the use of Carboloy cemented carbide has made possible the checking of comparative hardness inside of small bores. The actual application is the checking of hardness of threads in castellated aircraft engine nuts. The carbide is in the form of an "edge" penetrator mounted in a Caxtension arm on a Rockwell machine.

Spot · Butt · Arc WELDERS

Eisler resistance spot welders are available for all types of welding in ½ to 300 KVA sizes. Write for catalog. Ask about our contract spot welding service.



Ask for Eisler's latest catalog.

35KVA. Air operated. Slide Horn, Adjustable Arms. Weld Timer and Contractor. Excellent for universal applications.

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FOOT AIR MOTOR OPERATED

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Spot Welders
FOOT, AIR
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ENGINEERING COMPANY

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This convenient unit is adaptable for all air operated machines wherever air control is required. Pressure regulator, gauge, control valve, lubricator and strainer are combined in one efficient, time-saving mechanism.



The Carboloy penetrator has an obtuse angle with a .010" radius at the edge (see insert). The modified "C" shaped steel holder is attached to the Rockwell machine, as shown in the other illustration. This arrangement enables the carbide "edge" to contact the internal threads of the nuts being checked.



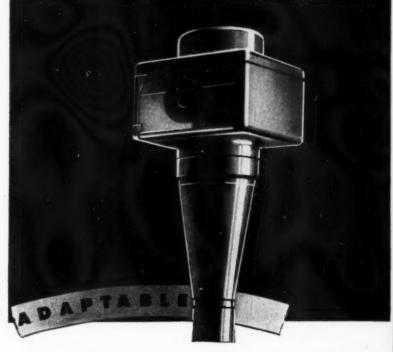
Conventional Rockwell scales—such as the "B" or "C" scales cannot be used, of course. The readings obtained are purely relative and the scale used is based on readings taken from checks of both acceptable and non-acceptable threads.

The use of a Carboloy edge penetrator prevents indenting or nicking of the testing "edge", as would be the case if steel were used in a similar manner.

NORTON ABRASIVES

Norton Co., Wooster, Mass., has released a new folder describing its cylinders and segments for surface grinding. A large number of segment shapes is reproduced, suggesting the variety which the firm has to offer for special jobs. Mention is made of a new Norton catalog, Form 2345F, devoted to abrasive segments used in chucks. Cylinder grinding equipment is also declared available in differing abrasives and bonds, as well as cylinders and types of mounting.

CRITERION Boring HEADS



On Criterion Boring Heads shanks are interchangeable enabling operator to use head on different machines. Ideal for slide boring tool holder on small turret lathes. Smooth, compact, rigid. Lead Screw ground from solid AFTER hardening. Sold throughout the U.S. Order

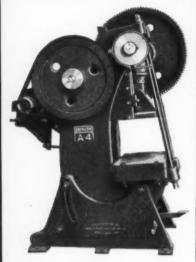
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CRITERION MACHINE WORKS
BEVERLY HILLS, CALIFORNIA

Long Recognized for durability strength and service



The new improved Series A Robinson Punch Presses retain all the sturdy characteristics of their predecessors with added safety, speed, strength and ease of operation and maintenance. Available in five sizes.

Send for descriptive Bulletin No. 7.

New Albany Machine Mfg. Co. New Albany, Indiana, U.S.A.





Inspecting machine operations in Sweden—Robert Gaylord, chairman of the board of the National Ass'n of Mfrs., learns Swedish skilled workmen face further squeeze of wage spread between skilled and unskilled labor. Skilled now average about 50 cents per hour, U. S. money, unskilled 46 cents. Returning from tour of Scandinavian countries as guest of Swedish Federation of Industries, Gaylord reported Sweden awaits U. S. lead on foreign trade policy and credits, heads toward nationalization of much of industry. In the photo, at Aga-Baltic Co., Stockholm, visiting U. S. industrialist watches Arne Bergman, toolworker.

APPRENTICE TRAINING

In reply to the thousands of inquiries from men in service for information on apprenticeship, a comprehensive booklet on the subject has been prepared especially for their guidance by Apprentice Training Service, U. S. Department of Labor. This booklet, entitled "Apprentice Training for Returning Servicemen", has been written in collaboration with representatives of the educational branches of the War and Navy Departments, and the Veterans Administration.

While this booklet is designed primarily for the men still in the services, it of equal value to those already released from service, and also to employers and labor organizations, especially in gaining a clear understanding of the veterans

THE 1945 MODEL

MICRO-JURN/HREAD

With a Micro-Turn Thread installed in the tool post of your engine-lathe, you can produce a wide variety of parts with speed and accuracy closely approaching that of a screw machine.



Single point turning tool in operation, reducing % rod to 3/16.



Forming, knurling, and cutting off.



Three step turning tool in operation.

A Micro-Turn Thread will greatly reduce your set-up time and increase production.

With its quick-change, self-locking tool holders it is possible to accurately produce parts at a rate heretofore unheard of on an engine lathe.

Perfect concentricity and duplication of precision dimensions on a production basis is certain.

Unsurpassed rigidity and sensitive adjustment are features which make it possible for us to guarantee Micro-Turn Thread performance.

Write for descriptive literature and price information. Manufactured and distributed by

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CARBIDE REAMERS CENTERS FORM TOOLS **END MILLS** SPECIALS

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Send Catalog on Carbide Reamers, Centers, Form Tools, Specials.

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Address ...

legislation as applied to ex-servicemen who are employed as apprentices.

Included in the information contained in this booklet is an explanation of the financial benefits of the veterans legislation which supplement apprentice wages. qualifications required of veterans for these benefits, as well as for apprentice training, procedure to follow, application forms and experience records needed. Among the other data presented is a list of over 100 skilled trades in which workers are trained thru apprenticeship and 10 major points which identify a bona fide apprenticeship program.

Copies of this booklet may be obtained by writing to Apprentice-Training Service, U. S. Department of Labor, 1778
Pennsylvania Ave., N. W., Washington 25,



"EYEING" THE NEEDLE! Agnes G. "EYEING" THE NEEDLE! Agnes G. Dombak performs a grinding operation on a fine steel needle used for drilling diamond dies at the Dobbs Ferry, N. Y. plant of North American Philips Co., Inc. Due to the abrasive action of the diamond powder, needles wear quickly. They must be reconditioned at frequent intervals to assure accurately-shaped dies which are so essential in the production of fine wire needed for electronic devices.

"KNOCK-OUT" DRILL CHUCKS

K. O. Lee Co. Aberdeen, S. D., has issued a new price list and descriptive circular of its "Knock-Out" Drill Chucks. These are described as keyless, self-energizing and self-centering and are suggested for small electric drills, drill presses and lathes. Interchangeable chuck lists are given for portable tools and for drill presses.

Now!

AN ACCURATE

Low- Cost

SPEED INDICATOR

for

- MOTORS
- . LATHES
- · SAWS
- GRINDERS
- PUMPS
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METAL SCALE WITH NON - BREAKABLE PLASTIC COVER. REMOVABLE RUBBER TIP FOR SHAFTS WITHOUT CENTERS

HARDENED STEEL POINT

SEALED AGAINST DUST

SPEED RANGE 500 TO 3000 R.P.M.

REQUIRES NO LUBRICATION

DIAM. OF BODY 21/2"
WEIGHT 5 or.

Only . . . \$1.50 each ORDER NOW

The speed of shafting, wheels, etc., in either direction of rotation can be quickly and accurately (within 2%) determined with the new Standard Tachometer . . . Speed Indicator. Saves time . . eliminates guesswork. Rugged metal construction with unbreakable plastic windows assures long life. A "must" for mechanics, electricians, inspectors, time study, engineers, maintenance and service men. Order today. Only \$1.50 each. We pay postage when cash is received with order.

INDUSTRY TOOLS, INC. =

1025 Fifteenth St., N. W., WASHINGTON 5, D. C.

Clark HANDLES EASIER AT TOUGH ANGLES"



"When overhead drilling has to be done, try a Clark! Its excellent balance and compactness make it ideal for jobs that must be done at muscle-tiring angles."

Remember this about all Clark portable tools . . they're easier to handle at an angle. That's why workers produce more with these dependable tools.



Jas. Clark, Jr. Electric Co. 614 Bergman St., Louisville 3, Ky.

WELDING TRAINING FOR VETERANS

Hobart Trade School, Inc., Troy, Ohio, conducted by The Hobart Brothers Co., is now enrolling Veterans of World War II in a specialized welding and metalworking training course which has been approved by the Veterans Administration to train discharged soldiers under the G. I. Bill of Rights.

The new training course covers a period of 16 weeks totaling 640 hours of individual instruction in arc and acetylene welding, special alloy metals welding, carbon arc welding, hardfacing and tool welding, metallizing with the metal spray gun, resistance welding, "submerged melt" process of welding with automatic head, stud gun welding, and the Heliarc method of welding magnesium and other light weight metals.

Trainees are individually instructed by expert, long-experienced operators who are good instructors as well, all of whom are under the direction of Robert Bercaw, veteran Hobart instructor at the company's plant for many years. Students, in individual, well ventilated booths, keep their own "shop", each having his own welding machine and equipment of the latest type. In addition to regular training course equipment, students have use of swing lathes, drill presses, throat cutting shears and x-ray and tensile testing equipment for finish-

tiveness of their welding training.
Veterans of World War II who have been discharged or released from active service under conditions other than dishonorable are eligible for this training under the G. I. Bill of Rights and the government pays tuition fees plus a living allowance while student is in training. Students may enroll for the entire course of 16 weeks or select any shorter specific training of his own choosing.

ing their work and determining effec-

Applications for training under the G. I. Bill of Rights may be obtained thru any Veterans Administration Field Office or from the Hobart Trade School, Inc., Troy, Ohio.

GEAR TOOTH MILLING GUIDE

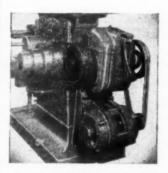
"Cutting Gear Teeth on a Milling Machine" is the title of a 32-page booklet, No. M-1397, issued by the Cincinnati Milling Machine Co., Cincinnati 9, O. It contains instructions on cutting worms and worm-wheels, and spur, helical and bevel gear teeth on a milling machine. The text, which is quite general and applies to any make of milling machine, is illustrated with both half-tones and diagrams.

Speed PRODUCTION UP TO 25% WITH

TORO MOTORS AND DRIVES

FOR LATHES • SCREW MACHINES
MILLING MACHINES • OTHER
STANDARD MACHINE TOOLS





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In most cases we can deliver within three or four weeks. And that means early speed-up of your production, thanks to modernization of your present equipment. With Torq drives and motors you may speed production up to 25%, and make the changeover so easily you lose no valuable production time in waiting. You will be prepared for post-war with completely modernized equipment.

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TORQ-QUA-MATIC DRIVES: 4 selective speeds, 1 to 15 H.P., alloy steel gears, anti-friction bearings. Proven design . . . improves production up to 25%.

NOTE THESE LEADING USERS

Listed here are a few of the leading American War Plants which successfully use Torq Motors and Drives: White Motor, Cleveland Cap Screw, Cutler-Hammer, Republic Stamping, Valley Mould & Iron, H. B. Sacker Mfg. Co., Thompson Products.

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Producto machine Vises embody all modern refinements in design, construction and material . . . are built not alone for normal shop operations but also to meet the toughest conditions of precise production.

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CAPACITIES ½ TO 3 HP - CAPACITIES 5 TO 20 HP



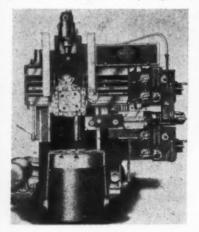


WHAT'S NEW IN METALWORKING

BULLARD PRESENTS AUTOMATIC LATHE CONTROL

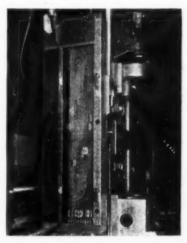
MAN-Au-Trol, a new automatic lathe control mechanism developed by The Bullard Co., Bridgeport, Conn., is particularly interesting at this time, in view of the increasing trend towards self-actuating industrial machinery. What it does is to operate the machine like an expert operator would, precisely and repetitively, but much faster and more accurately than it could be done by human hands.

The initial setup of drum stops, "banjo wire" stops and tools does require some time on the part of an operator familiar with the machine. After everything is set



Here is a 30" Vertical Man-Au-Trol controlled Turret Lathe with turrets on vertical and side heads.

and the tools adjusted, the machine repeats its cycle over and over. All that is required of the operator is to load and unload the work and push the button to restart the machine.



Note the adjustable stops on the "banjo wires". Behind these are two banks of limit switches. This is one of the two centers of automatic control by means of which work sizing is accomplished.

At any point in the automatic cycle, movement of a single lever completely cuts out the automatic operation and converts the machine to manual control, which in no way affects the automatic settings. In the midst of an automatic

SHELDON

Now Available!

Coming off the new production lines in Chicago, the SHELDON-built SHELDON-Vernon Precision Machine Tools* are now available at the same moderate prices that made them first in the moderate priced field. Built in the new modern SHELDON plant which is equipped with every advanced machine tool building facility, they are better than ever—even more accurate, more rugged and better finished.

Lighter and smaller and less costly than machine tools of equal accuracy, they provide a faster, more convenient and economical means

of doing all but the heaviest operations. Write for Bulletin on:

*SHELDON-Vernon Horizontal Milling Machine

*SHELDON-Vernon Vertical Milling Machine and Jig Borer

*SHELDON-Vernon 12" Shaper

Builders of Good Lathes Since 1919

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HERE'S THE ACE UP YOUR SLEEVE FOR POST-WAR

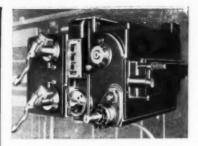
Is progress on your post-war products held up thru lack of facilities for dies, tools, stamping, heat treating, machining, grinding or assembling? Let ACE help you speed your much-wanted new products to market.

Here under one roof are the ingenuity and modern equipment to help you design that product of yours...make the necessary tools and dies... and put it into production. Furthermore, on certain products, we have a complete sales and merchandising staff to put it on the market, if you so desire.

Have an Ace up your sleeve. Plan with Ace now.



ACE MANUFACTURING CORPORATION for Precision Parts 1251 E. ERIE AVE., PHILADELPHIA 24, PA.

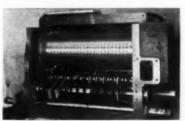


Here are the automatic control unit and feed works of main head. Note the convenient grouping of dials, pushbuttons and levers.

run, it is possible to run off several manually controlled jobs and then resume automatic operation without loss of time. In fact, this feature is used when setting up the machine for an automatic run.

The controls will automatically duplicate any job that can be performed on a Bullard Cut-Master Vertical Turret Lathe, Horizontal Lathe or Chucking Machine. It permits any combination of control requirements involving 39 or less individual functions of each turret head without cumulative error.

The control unit is applied to both main and side heads, or to either one as desired. Essentially it consists of a control box and a series of horizontal and vertical electrical control switches, suitably housed. Inside the control box is a metal drum carrying a series of adjustable dogs providing for the different machine functions, including vertical and horizontal



This drum indexes step by step, causing adjustable dogs to institute up to 39 functions in accordance with the prearranged setup. Dogs are not shown.

GOVERNMENT SURPLUS

MACHINE TOOLS and PRODUCTION EQUIPMENT

CAN HELP YOU RECONVERT!

Government-owned Machine Tools and Industrial Equipment are available now to help industry shoulder the reconversion load.

It is the responsibility of the Reconstruction Finance Corporation to dispose of these surpluses as soon as possible—to turn them over to private industry, where they'll do the greatest good for the most people in the shortest time.

Therefore, in order to speed reconversion by getting this equipment into the hands of skilled craftsmen, faster . . . we ask you to follow this simple procedure:

- O Submit in writing your requirements for machine tools and industrial equipment to us now.
- Send a typewritten list to your nearest R.F.C. Regional Office listed below.
- Make your descriptions brief, one line if possible, clearly grouping various types of equipment you need.

The supply of surplus tools is sufficient to meet all of the needs of industry, and in the event that your local R.F.C. Regional Office cannot fill your specific requirements, it will endeavor to locate needed equipment from other offices throughout the country.

First step in creating jobs is getting machines in motion faster.

The 31 strategically located agencies below are ready to make your reconversion problems easier.

Reconstruction Finance Corporation

A DISPOSAL AGENCY DESIGNATED BY THE SURPLUS PROPERTY ADMINISTRATION

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PORST Bros. Collets and Feed Fingers



- 1. The stock hole. Long gripping surface insures holding power.
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- 3. The body. Close tolerance maintains better concentricity.
- 4. The threads. Proper fit of angle preserves life of draw bar.

"Porst" is a time-honored name in collets—your guarantee of quality products. Careful inspection at every stage of manufacture assures you utmost accuracy. Porst collets are ground after controlled temper hardening. The threads on the lathe collets are ground from solid.

For the utmost in collet satisfaction, specify a "Porst".

Let us send catalog.

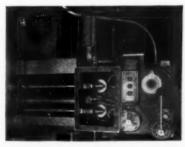


DRAW-IN COLLETS FOR ALL LATHES AND MILLERS, SCREW MACHINE COLLETS AND FEED FINGERS for All TYPES OF MACHINES

movement of the heads, changes of speed and rate of feed. As each function is completed, the drum rotates to bring the next dog or dogs into contact with hydraulic valves which control but do not actuate the various movements.

Within the electrical control switch housing is a series of small metal blocks, each sliding on its own pair of wires. One of these wires is fixed while the other is adjustable by means of a micrometer screw.

Actual feeding of the tools and other motions of the slides are carried out by the regular mechanically driven lead or feed screws or worms to the full range required by the work. In other words, the machine has the same range, whether operated automatically or manually. Sizing of the work may be corrected while operations are in progress, thus permitting compensation for tool wear. In many cases, one tool may be employed for several different cuts, also for roughing and finishing. Obviously, this reduces the total number of tools required.



End plate is removed from control unit to show portions of feed works and connections to feed rod and lead screw. Drum bearing is at upper right.

The only limitation in automatic control is in the matter of speed changes. The machine ordinarily has 20 speed changes, of which any six can be attained automatically. This range of six should suffice for any ordinary job.

Each head incorporates an independent feed unit providing six feeds ranging from 0.0006 to 0.125" per work revolution. Four directions of feed—up, down, in and out are provided at any one of the 16 rates. High speed traverse is provided in all directions thru friction clutches. Hand motion is thru hand wheels which disengage automatically when power is

SURFACE GRINDERS



Hydraulic Feed — Hand Feed

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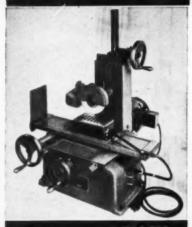
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A sensitive machine built to rigid standards of accuracy and workmanship specially designed "For the job that fits in your palm."

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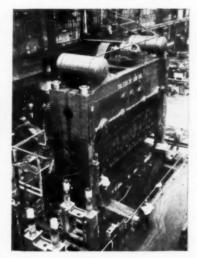
Available On M. R. O. Certifications

SANFORD MFG. CO.

1279-81 Springfield Ave. Irvington 11, N. J. applied. Each hand wheel has micrometer dials and observation stops.

Man-Au-Trol was developed before the outbreak of the war, but secrecy orders prevented disclosure. A battery of Cut-Masters with Man-Au-Trol was used by Bullard on war production which gave the Company an unusual opportunity to prove their versatility. The first public showing was on Oct. 11 before a gathering of editorial representatives. On this occasion, the big machine ran thru its cycle with uncanny speed and precision. The demonstration piece which regularly required at least 20 minutes under expert manual control, was machined in five minutes and 45 seconds under Man-Au-Trol. And that could be repeated 24-hours a day, week after week.

BLISS-TOLEDO RAIL PRESS



Sound and thoro engineering, versatile machining methods and unusual erecting facilities are required to produce a press weighing 1,250,000 pounds. Because all of these essentials were merged so as to make the job appear almost routine, the entire organization of the E. W. Bliss Co., is quite proud of the 2500-ton Toledo, single-action, straight-sided press shipped recently from the Brooklyn plant en route for Russia to take its place in that



• GUILD is the new name for an old established line of reamers whose reputation for accuracy has become outstanding in the manufacture of aircraft-motors-en-gines-small armsradios - fine instruments, etc. The name GUILD is stamped on each individual reamer as an identification-a hallmark of finest quality. Quality that is possible only by creative and productive ability far above the average in the manufacture of reamers specially built for special purposes. Write for booklet.

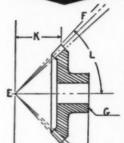
METAL CUTTING TOOLS AND MANUFACTURING CO. 11121 Grand River Ave., Detroit 4, Mich.

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What STERLING is to silver

is to Reamers

Here's the Problem



... and here's the Answerl EASY BEVEL GEAR GAUGING

No Long Calculations No Involved Set-up

With Herkimer sine bars and bevel-gear gauges, anyone with ordinary gauging experience and ability to read blueprints can quickly and accurately check all important bevel gear dimensions and relations. Production gauging made easy.

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On ALL METALS
 Quickly applied with brush or cloth. Dries insteads, and for position.

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Adheres perfectly to any clean, dry surface; no special preparation required.

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Will not blur, smudge, chip or peel.

Lines remain sharp and highly visible throughout all normal shap handling.

Low in cost, economical to use.



For full information on this NEW, BETTER layout dye, write for free descriptive bulletin.

PENINSULAR CHEMICAL PRODUCTS COMPANY 6795 E. NINE MILE RD. VAN DYKE, MICH. country's expanding industrial program of mass-production.

Said to be one of the largest presses ever built, this two-crank rail press of the crown type can blank two chassis frames every ten seconds, operating at six strokes per minute. Production will be determined by speed with which material handling can be accomplished into and out of the press.

Bed area of the press is 80", front to back by 315", left to right. It will accommodate two sets of the same die to make rails for trucks, tractors, or automobiles, box car ends and main beams for freight cars.

It is estimated that 15 freight cars will be necessary to transport the press after it is taken apart and boxed. Special railroad equipment will be needed to carry the crown and slide castings.

Crown of the press, a one-piece casting is 30 feet long, 7½ feet high, weighing 147,706 pounds. The slide weighs 143,000 pounds and is also a one-piece casting. The bed is a two-piece casting each part weighing 144,000 pounds, held in place by tie rods which are shrunk together.

GRINDS CURVED CLEARANCES



A "curved clearance," providing maximum support behind the cutting edges of taper reamers and all other types of profile cutting tools, is produced by a new tool grinder, just announced by the

DRILL JIG BUSHINGS



Get details on our two bushing standards —

Write for our bushing catalog today . . . no obligation!



ACME INDUSTRIAL COMPANY

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A LAP AHEAD ...

• Smith Precision Lapping Plates are always "a lap ahead" on intricate lapping jobs. They are grooved in a diagonal pattern, which distributes the compound evenly over the surface — and they're soft enough to take a charge of lapping compound, and hold it. Result: a faster, more accurate lap.

And what's more, Smith Precision Lapping Plates are built for long service. Their scientific design and exclusive type of rib reinforcement preserve their accuracy right out to the edge and assure a permanent flat plate.

You can keep "a lap ahead" with Smith Precision Lapping Plates! Send for information.

SMITH TOOL & ENGINEERING CO.

855 Sandusky Ave. BUCYRUS, OHIO

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MASTER SURFACE PLATES

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PLANER-FINISH PLATES

Precision

TAPPING

Leads changed in 90 seconds



M & L

PRECISION TAPPER

This is a fast rugged production tool capable of sustained accuracy. Flexible and adaptable, it cuts clean screw threads, handling up to ¾" in nonferrous metal and 0 to ½" in SAE steel. Class 3 and Class 4 gage fits and high production schedule are accomplished in normal operation even with unskilled help.

Tapping speeds are 95 to 350 rpm with reverse speed twice that of forward speed. Taps are guided by precision ground lead screws which are easily and quickly changed. Bulletin 143 gives full details.

Dealers' inquiries

LECKINGER

MACHINE AND EXPERIMENTAL CO. 716 N. Highland Ave., Los Angeles, Galif.

Joshua Hendy Iron Works, Sunnyvale,

The "Standard" Hendy-Larsson Reamer and Cutter Grinder is equipped with a 30" sine bar for the grinding of taper reamers to accuracies of .0001" or closer. The "Junior" model with a 20" sine bar, is an attachment unit that will fit on any standard cutter grinder.

Three adjusting dials eliminate the necessity of checking clearances and reduce set-up time to a minimum. Using them, the operator sets the machine to the proper cutter diameter, adjusts the clearance slide, and dresses the cutter wheel. Grinding to the desired clearance may then proceed. A carbide-tipped locating finger, synchronized with the dresser, prevents error, and the finger moves automatically with the abrasive wheel as it wears down. Clearances, once established can be duplicated indefinitely.

Important economies, the manufacturers claim, can be effected by use of the grinder. Since the curved clearance provides a maximum amount of support directly behind the cutting edge, the tool will go longer without reservicing, and since only .005" is removed in the resharpening process instead of the usual .015" to .025", life of the tool is materially increased. With the stronger cutting edges, higher speeds and coarser feeds are permitted, and better finishes are achieved.

An eight page pamphlet (JHA-16), describing the Hendy-Larsson reamer and cutter grinder in Standard and Junior Models is available.

SAW BLADE MANUAL

Latest information on selection, care, and use of hand and power hack saw blades is offered in a pocket-size booklet published by Victor Saw Works, Inc., Middletown, N. Y. Entitled "Metal Cutting", the 30-page illustrated handbook is a revision, brought up to date, of the previous Victor booklet of the same name which went thru several printings.

Written for both the experienced and inexperienced machinist, "Metal Cutting" also contains up-to-date specification tables and price lists. The teeth and cutting speed tables for various metals, and the sections on causes and cures of common blade difficulties are among the popular features of the earlier edition that are retained.

Except where text states otherwise, recommendations given in the booklet apply to the use of all hack saw blades,

December, 1945

PRESSES SPEED CYLINDER BLOCK ASSEMBLY

ingenious set-up combining deep-freeze, heating, and hydraulic presses for assembling eight steel sleeves in the bores of a V-type cylinder block has been in use by a well-known manufacturer. The process was worked out in cooperation with Colonial Broach Co., Detroit, Mich., who designed and built the special assembly presses used.

The steel sleeves are cold-treated by refrigeration at the same time the blocks are being heated. The chilled sleeves are pressed in two at a time on a dual

press. The cylinder block is indexed into position for each subsequent pair of sleeves. Spring loaded plungers which contact index grooves on the side of the fixture slide, insure alignment.

When block and liners return to room temperature after this operation, the liners assembled develop a tendency to "crawl" up out of the bores. It thus is necessary to "set" the sleeves after cool-



permit progressive automatic and hand welding

> eously. Four C-F Positioners are grouped around one automatic welding machine—2 No. 12s (1,200 lb. capacity) in diagonally opposite corners, 2 No. 140s (14,000 lb. capacity) in the other corners. With this arrangement, the single automatic welding mas chine can serve all 4 positioners and is used for all peripheral welds on the weldments. For this operation, the positioner ro-tates the tilted weldment under the electrode at any desired speed from 0 r.p.m. up. While the automatic welding machine is busy on one weldment, 3 welders are completing the hand welding operations on the other 3 C-F Positioners, which under push button control, turn and tilt weldment to any desired position permitting all welds to be easily made "down hand". Write for Bulletin WP-22

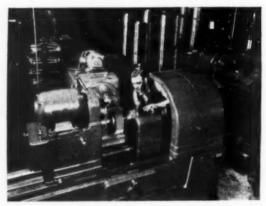
CULLEN-FRIESTEDT CO., 1321 S. Kilbourn Ave., Chicago 23, Ill.

ing. For this the special vertical press is used. This press operates on a combination of hydraulic pressure and impact. The platen is inclined so as to automatically align each row of bores with the plunger of the press. Locating stops in the raised strip on the platen, position the cylinder block for each sleeve.

To set the sleeves, hydraulic pressure

is applied by a piston in the ram. At the same time, air pressure lifts a weight above the hydraulic piston. At top of the column, the weight is tripped and dropped on the hydraulic piston plunger. This produces an additional impact load which drives the sleeve and sets it in the cylinder bore.

FINISHING LARGE GEARS IN JOB LOTS



Precision gear-finishing, originally associated mainly with such mass production quantities as are customary in the automotive industry, has in the past few years been extended into the field of small size (instrument type) gears and also to larger sizes produced in relatively small quantities.

The flexibility of gear-finishing equipment for larger gears, as exemplified by the Michigan Tool Model 862-24 (handling gears up to 24" OD) however, has made it possible to apply precision finishing to production of gears in job lot quantities.

This is well exemplified by Fairfield Mfg. Co., Lafayette, Ind., producers of gears for specialized equipment—including industrial machinery, tractors, buses, etc. In a normal year the company routes approximately 2500 different items over its production lines. Most of its spur

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the most complete catalog of its kind, illustrating hundreds of rotary files hand cut, milled cut, ground from the solid; also diesinkers' burs.

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AILSTOCK CENTER PROBLEM SOLVED!

"DEAD CENTER ACCURACY & RIGIDITY with PRECISION BEARINGS" Roto-Center HIGHEST SPEEDS - COARSEST FEEDS - NO CENTER SPOILAGE

EXCLUSIVE FEATURES

- Two Timken Roller Bearings
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- Heavy Duty Bearing Seal
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Low Cost Morse taper 2's and 3's - \$20.00 each

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MILWAUKEE 13. WIS.

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CUTS MUCH FASTER - LASTS MUCH LONGER

Diamond Tools & Wheels To Your Specifications SEND US YOUR PROBLEMS



Free Engineering Service

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Reduce Toolroom Bottlenecks with Speedy JOHNSON Units!

Harden high-speed steels, tools, dies and small parts quickly and at Low Cost!

JOHNSON No. 120 1500° F. in 5 Minutes! 2300° F. in 30 Minutes!

high-speed steels .



\$129.50 F.O.B. FACTORY

Johnson Blower.

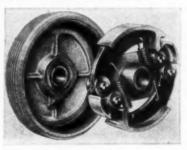
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and helical gears, cut on either gear shapers or hobbers go to the single Michigan 862 for finishing (shown).

SALSBURY AUTOMATIC CLUTCH

To eliminate the sudden shock of starting machinery or moving equipment, a unique, automatic clutch has been developed. It can be installed direct on the shaft of any engine or electric motor. Known as the Salsbury automatic clutch, the device, by centrifugal action, progressively applies power to the driven machine. It engages and disengages with-out human control. It is claimed to offer the advantages of a fluid drive, and in addition permits complete disengagement while idling and positive engagement when driving, with no possibility of slippage. It is said to offer long-desired opportunity to improve starting and operating characteristics of machinery.



The centrifugal principle, in simple form, is employed to obtain velvet-like action. The clutch is of the opposed shoe type, dual-spring balanced, to give the desired degree of tension required for individual applications. Below a predetermined rpm. of an engine or motor, the clutch idles; when the driving rpm, increases beyond the stipulated speed, the expansion shoes press outwardly, contacting the friction lining of the drum.

Two models are available-one for the range from fractional to 3 hp, and one for up to 6 hp. Different drives can be mounted on the shaft—V-belt or flat belt pulley, gear, sprocket, coupling, or a variable speed transmission. The 3 hp model has a drum diameter of 54/4" and length of 2-11/16"; the 6 hp model has a drum diameter of 71/4" and length of 41/2".

Manufacturers are Salsbury Motors, Inc., 4464 District Blvd, Los Angeles 11,

HARDINGE OFFERS NEW MODEL PRECISION LATHE

Hardinge Brothers, Inc., Elmira, N. Y. announce their new model DV59 High Speed Precision Lathe designed for use in tool rooms, laboratories and production departments working to extremely close tolerances and finish specifications.

It incorporates all the points of their precision lathe line, in addition to these new features:

The steel bed ways are of an improved dovetail design, hardened and ground to master gages. The ways form a solid bed top and the design protects the accurate angular way surfaces from falling chips and foreign matter.

The bed has a threepoint mounting on the welded steel pedestal base, assuring original



THIS IS THE SECRET!



Vonnegut Brush-Backed Abrasive Head with end cap removed, showing magazine loading of 32 strands of abrasive coated cloth. The yielding action of the brushes automatically causing the abrasive to conform with irregularly shaped surfaces and forcing the ends of the shredded abrasive into depressions is the secret of the Vonnegut Brush-Backed Abrasive Head.

This head is ideal for clean-up work in preparation for final finishing operations. It is productive, economical and so simple that a new man gets immediate results.

For details, write to:

VONNEGUT MOULDER CORP. 1805 MADISON AVENUE INDIANAPOLIS 2, INDIANA

bed accuracy even when machine is placed on an uneven floor.

The fully enclosed headstock is of preloaded ball bearing spindle construction. Spindle is ground to take standard 1" ca-pacity 5C Hardinge Collets and 6" capacity step chucks. Spindle nose is supplied with either the Hardinge standard taper nose or Hardinge standard threaded nose for direct application step chuck closers, jaw chucks and face plates. Headstock spindle is driven by a "center drive" belt. The center drive construction places belt between the spindle bearings for balanced bearing spread and equal



Pictured: a 38-Spindle Heavy-Duty Drill Head.

DESIGNERS AND MANUFACTURERS OF MULTIPLE DRILLING EQUIPMENT

We invite your inquiry.

distribution of belt pull and belt is easily replaceable without removing any part

of machine.

The new compound slide rest is securely anchored to dovetail bed ways by a patented positive lock. This lock affords rapid positioning of compound slide rest on the ways. Index slide has a hardened and ground steel section to resist wear. Feed screws are hardened and mounted in preloaded ball bearings for long life and sensitive operation. Index slide will swivel 360°. The large, easy to read 2" diameter feed screw dials are graduated for direct reading in thousandths.

Ball thrust tailstock spindle has a constant full bearing in tailstock body regardless of position in tailstock body. Tailstock body has a mating dovetail section to securely anchor tailstock.

The welded steel pedestal base fully encloses driving unit and tool storage compartment. Front of the pedestal base is arranged for adequate knee and leg room. An adjustable foot rest is provided.

Electrical equipment is a built-in part of machine, providing magnetic control with start and stop push button operating on 110 volts and has time lag thermal overload relays providing overload and low voltage protection.

The machine has Hardinge prewar finish and is shipped with motor and wiring complete ready for immediate operation after connection to the power line.

NELCO CARBIDE TOOLS

A comprehensive line of carbide tipped milling cutters and end mills, designed for machining all metals and plastics, is announced by the Nelco Tool Co., Inc., 370 Hamilton Ave., Brooklyn 31, N. Y.

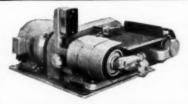
The line includes two and four flute carbide end mills from 1/4" diameter up to 2"; large end mills up to 5" diameter with No. 50 NMTB shanks; shell end mills;

PEERLESS No. 606 - 6" BENCH SURFACER

This BELT SURFACER is a compact, durinis Bell's Surfacen is a compact, durable, smooth running machine with quick and convenient adjustments. It quickly cleans and finishes castings, dies, stampings and any work that can be ground. Gives a straight line finish, leaves sharp edges and eliminates hand labor. We also make other belt surfacers, tool and cutter grinders, sensitive drills, etc.

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● The Baker Model 3 Contour Grinder provides economical, rapid and accurate grinding and polishing of contours or irregular shapes. Provided with vertical reciprocal movement of spindle—3/16". Diamond dresser is standard equipment and is quickly mounted.

Provided with vertical recipront of spindle—3/16". Diamond standard equipment and is need.

Capacity, diameter of wheels—½" to 4". Capacity, face of wheels—2" - 2½"-3". Diameter of table—18".



First star:

October 21, 1944 Second star: June 25, 1945

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WHITNEY METAL TOOL COMPANY

face mills; slotting cutters and half side mills up to 8" in diameter.

Cutters are of the heavy, rugged brazed-in type, embracing several outstanding features. The bodies are of a special alloy casting having extremely high strength. Designs are purposely heavy to provide a flywheel action. An 8" Nelco face mill weighs 25 pounds. Extremely heavy carbide tips are employed to withstand shock, improve tool life, and permit many regrinds before new tips must be brazed in.



A special brazing method is used which is claimed to increase the number of pieces machined per grind, besides greatly decreasing the possibility of breaking the tips. The tools are manufactured for mounting on standard No. 50 NMTB spindles or standard milling cutter arbors. No special adapters are required for mounting the tools.

Another feature is a new tool design for successful milling of steel on machines of old design or low powered machinery otherwise unsuitable for carbide conversion. A bulletin gives full details.

BEARING ENGINEERING BOOK

A 270-page technical book, entitled "Ball and Roller Bearing Engineering" has been published by SKF to serve as a fundamental text on all phases of bearing applications to industry.

The book, containing some 900 drawings and tables, begins with a technical description of common bearing types and continues thru nine chapters of fundamental engineering studies. Both radial and thrust bearings are discussed comprehensively in Chapter I.

"Forces and Motions in Bearings," is the subject of the second chapter. Other chapters deal-with studies in the carrying capacity of ball and roller bearings, bearing selection, design of bearing applications, mounting and dismounting, lubrication and maintenance and bearing failures. The final chapter is made up of

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able spindles are quickly set to able spindles are quickly set to tay hole pattern within 5" circle—14" minimum centers. Standard capacity 3" to 42" drills. Modifications available for special applications.

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Two-inch capacity, now only \$145 One-inch capacity, \$95 Round, square or hex collets, plain-serrated

HALL MANUFACTURING COMPANY 622 Tularosa Drive • Los Angeles 26, Calif. tables, conversion values and a description of symbols and abbreviations.

Dr. Arvid Palmgren, the author, has spent nearly 30 years in his field of bearing engineering.

First copies of the book will be sent by SKF to the heads of leading corporations, technical schools and colleges and libraries in principal U.S. cities. Later editions will be sold at cost by the company for students and others interested in bearing studies.

KIRK HEADS NMTB



Wm. P. Kirk, Vice President, Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford, Conn., assumed Presidency of the National Machine Tool Builders Ass'n at the recent Fall meeting in Chicago. In addition, these new officers were elected:

First Vice President, Herbert H. Pease, President, New Britain-Gridley Machine Division, New Britain Machine Co., New Britain, Conn.

Second Vice President, Al G. Bryant, Vice President, Cleereman Machine Tool Co., Green Bay, Wis.

Treasurer, Richard E. LeBlond, President, R. K. LeBlond Machine Tool Co., Cincinnati.

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BUTTERFLY FILING and SAWING MACHINE

(Die Making Machine)

This is a very heavy, powerful machine and is designed for extra heavy filing and sawing, but it performs small work just as well. This type of machine is usually adopted in Ammunition Plants, Airplane Factories and machine shops where heavy and precision filing and sawing is desired. We also manufacture smaller models—Model D-10° Table; Model E.L. 12° Table.

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Elliott Unit Drives can be attached to any motor in your plant easily and quickly, and will give you efficient service at low cost. Unit Drives can be applied in hundreds of finishing operations or wherever constant power in a portable tool is needed. Many types of attachments can be used.

Investigate the advantages of the Elliott Unit Drive . . . write for Bulletin 44A giving complete information and prices.

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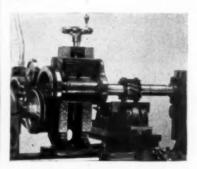


BAY STATE TOOL & MACHINE CO

New directors to serve for three years are: —Al G. Bryant; William L. Dolle, President, Lodge & Shipley Machine Tool Co., Cincinnati; and Fred W. McIntyre, President, Reed-Prentice Corp., Worcester, Mass.

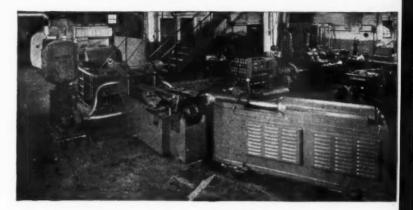
GLOBE MILLING ATTACHMENT

Recently released from war duty on the fighting fronts is the new, improved Globe Miller, designed to convert a lathe in less than three minutes into a combination machine which does precision milling work. The attachment fits the ways of the lathe and its operation is identical with that of a standard milling machine, except that the spindle is moved into position to engage the work, rather than the work lifted to engage the spindle. The Miller was incorporated into many thousands of mobile repair trucks that followed U. S. armies because many field jobs call for milling operations.



In addition, the Globe Miller increases the swing of a small lathe by almost double. For example, the swing of an 11" lathe can be increased to 19½", large enough to true up good-sized truck drums as well as drums for passenger cars. Costing only a fraction as much as a standard miller, the Globe can perform practically any milling operation such as gear cutting, slitting, gang-milling, cutting "T" slots in castings, cutting keyways in shafts, etc.

For detailed information, address Globe Products Mfg. Co., 3380 Robertson Blvd., Los Angeles 34, Cal., for Bulletin B-60, giving make and model of your lathe, lathe swing, power or hand cross feed, and state whether lathe is equipped with a telescoping taper attachment.



Several features new to the welding rod processing industry have been introduced in a complete processing plant designed and built by the Moslo Machin-ery Co., Cleveland, O. A new principle of extruded flux application employs a centralized control panel by which one man can start and stop every unit in the plant; a compacted seven-pass oven saving 40 per-cent on floor space, and an im-

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Paddock Ball-Bearing Band-Saw Guides Give Greater Support To Your Saws

You can crowd your saws without fear of blade breakage. More production is the result.

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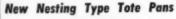
proved mechanism which transfers electrodes from one pass within the oven to the next in accurate alignment without dropping or rolling. A new type of slug press is a part of the equipment shown. Installed with the hydraulic piston partly below floor level, this press can be charged and slugs removed at the operator's waist height. Fast production of slugs, with a minimum of operator fatigue are among the advantages indicated.

The plant was built as a part of expansion program of the American Manganese Steel Division of the American Brake Shoe Co.'s Chicago plant. It is for production of their special manganese alloy rods with a capacity of 350 coated rods per minute.

Smoother operation of the plant and greater uniformity of coated rods is achieved by the newly designed die-head, in which flux is extruded onto the wire at an angle of 60° in the normal direction of rod flow, rather than at right angles as in conventional die heads. Another new feature is delivery of exruded rods directly onto the brushing machine without use of a transfer conveyor. The unit control panel is said to be unique in plants of this type. On it are start-stop controls for each unit in the complete plant, plus a single emergency button controlling all units. One man, at the main operating station, thus has full command of controls without moving from the central operating station. In addition, a newly patented electronic safety control which is a part of the transfer mechanism, shuts down the entire plant in the event of misalignment of rods at any of the transfer points, which might cause the system to jam.

The transfer mechanism itself embodies an ingenious revolving carrier which literally picks up the rods from one pass and places them in the same alignment on the new pass.

A number of radical changes in heat treatment are said to be incorporated in the Moslo oven. The continuous chain conveyor is arranged so that seven passes are housed in an insulated chamber less than four feet high and 25 feet long. Closely controlled humidity is applied to the first two passes and a damper-balanced duct system assures constant circulation. Excess heat and humidity are evacuated to a duct for connection to the outside of the building. An insulated partition separates the first two passes from the rest of the travel. Temperature





20" long x 12" wide x 6½" deep.

16 ga., drag holes and handles both ends.

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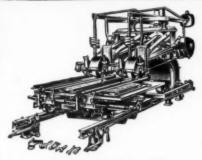
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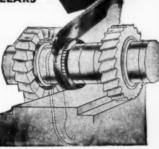
GANG MILLING SET-UPS

SIDE MILLING

You can make an accurate, positive adjustment just by loosening the cutter arbor nut and making adjustment as illustrated.

Made in 12 standards for cutter arbors from 1/8" to 2". Write for illustrated Bulletin 120-7.

DAYTON ROGERS MFG. CO. 2849 12TH AVE. SO., MINNEAPOLIS 7, MINN.



and humidity are graduated to control speed of drying, assuring the specified degrees of flux hardness in the finished

The oven is built in sections which like the individual production machines in the plant, can be shipped as assembled units, minimizing problems of erection when delivered.

The process of making electrodes comprises preparation of wire, preparation of flux, combining wire and flux and sub-

sequent drying of flux.

Wire fed thru a straightening and cutting machine is cut into lengths about

14" long. A mixing machine thoroly mixes flux which is placed into a hydraulic press, forming cylinders or "slugs". With the wire placed in the feeding machine and the "slugs" of flux inserted in the cylinder of the extrusion press, the plant is ready for production.

The coated welding rods are conveyed thru brushes which clean the ends for contact necessary in the actual welding operation. After brushing, the electrodes move into the new seven-pass oven conveyor system in which the electrodes are carried thru different controlled degrees of heat air and moisture and placed (not dropped) on successive conveyors as they pass thru the oven.

From the oven, the electrodes are conveyed to an inspection table where they are inspected and packaged for delivery. Mr. Moslo states the company is prepared to offer the same type of design in complete plants with capacities up to 1000 electrodes per minute.

ARTUS ARBOR SPACERS The COLOR tells the THICKNESS



made of plastic in various colors identify thickness at a glance! .001, .0015, .002, .003, .005, .0075, .010-.030. Speed up accurate fitting at low cost. Write for folder.

ARTUS Arbor Spacers

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.0125 thick 10 eq. .001 .015 - .030 thick 5 eq.

100 SPACERS IN ALL 7/8" — \$2.80 $1\frac{1}{4}$ " — \$3.40 $1\frac{1}{2}$ " — 4.20

Other standard sizes also available.

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ARIDIFIERS NOW AVAILABLE

Aridifier air cleaners are now available without priority. They are designed to remove contamination, moisture, dirt, oil and fine scale from compressed air lines.

The device consists of a noncorroding housing, containing a vertical shaft concentric, with air inlet at the bottom and air outlet at the top. Upon the shaft are four multiblade rotors or impellers, made of durable molded plastic. Adjacent rotors revolve in opposite directions. The compressed air propels the rotors as it passes thru the Aridifier, and as the air circulates thru and around the vanes, any foreign matter it carries is thrown out of the air stream and drained into a sump. The manufacturer is the Logan Engineering Co., 4900 Lawrence Ave., Chicago, Ill.

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS Simply insert in holes,



invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S. - Inexpensive last for years.

Write for Circular NIELSEN TOOL & DIE COMPANY 1962 W. Eleven Mile Road Berkley, Mich.

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THOMAS PLATE EDGER

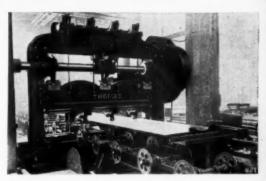
Substantially reducing the time required for side edging or trimming of plates preparatory to their being automatically welded, a new trimmer, the Thomas Plate Edging Machine, has been per-fected by Thomas Ma-chine Mfg. Co., Pittsburgh, Pa.

By simultaneously trimming both side edges in one pass, the plate is ready for automatic butt welding in a fraction of the time required by older methods.

The Thomas Plate Edger shears the material

rather than planes it. The shear cut, in addition to being more rapid, results in a tighter, more accurate joint between two plates than is obtained by any other production method, according to the manufacturer.

The Plate Edger may be operated by one man; and a high degree of skill is



not necessary. In edging the larger and heavier plates, however, it is economical to utilize a helper for loading and unloading. Tool set-up or change may be accomplished by the regular operator with a wrench and a simple measuring tool.

The machine is manufactured in sizes

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pletely submerged in water. · You'll welcome their low cost. . No metal reinforcements required. . Save Time . . . Money . . . Labor!

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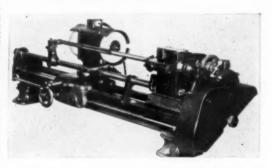
& MORAN STS., DETROIT 7, MICH. OUR FORTY-SIXTH YEAR

and capacities to handle any size or thickness of plates used in automatic

welding. A complete description of the machine is contained in Bulletin 318.

GRINDING LONG TAPERS AND TOOLS

A new tap grinder for sharpening staybolt taps, long taper reamers and other tools requiring relief grinding over long taper surfaces is an-nounced by Edward Blake Co., 634 Commonwealth Ave., Newton Centre 59, Mass. This machine is designated Model No. 4 and is especially designed so that the side of a small wheel is fed along the taper of long taps, obviating need of a wide wheel to cover the complete taper in one pass.



Wheel head and work head from the standard Blake Models No. 1 and No. 2 tap grinders are used on this machine. Work head is mounted on a lathe bed and wheel head is mounted on lathe carriage cross slide. Controls on the cross slide

give longitudinal and cross feed motions to wheel head.

Staybolt taps and long taper reamers are held on ball centers. The tailstock center can be moved off center any desired amount so that flutes remain paral-





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A recent addition to the COLBORNE line of Speed Lathes is the Series 30 machine. This speed lathe is indispensable for economical polishing, grinding, burring and lapping.

Very compactly constructed to do highest quality work with the COLBORNE features of spindle bearings running in oil, instant stopping brake, excepping collet and standard speeds of 600-920-1720-320-4800 RPM using 34 H.P. motor and cone pulleys. Collets and chuck may be used.

For more production per day choose COLBORNE.

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A USEFUL ADDITION

Modern precision machine shops and inspection departments will find this sturdy 36"x 48" MILWAUKEE SURFACE PLATE a valuable addition. Constructed of semi-steel, accurately machined, securely mounted on cast legs which are machined and provided with SAE adjusting screws for perfect alignment. Height from floor to top of plate 30". Can also be had in 38". Shipping weight 1200 lbs.

We also manufacture angles and parallels as shown underneath surface plate.



We also make larger and smaller plates either with planed or scraped surfaces, whichever is desired. Write today for full information.

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Anyone can do expert drill grinding with this simpleto-use drill grinding attachment—fits on any bench grinder—saves buying new twist drills—saves time



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This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes.

Vise No.	Width of	Opens	Weight	
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Unique construction enables operators to rapidly determine temperature even on minute spots, fast moving objects or the smallest streams; no correction charts, no accessories, no upkeep.

THE PYROMETER INSTRUMENT CO. 102-105 Lefayette St., New York, N. Y. lel to grinding wheel. Any desired relief can be obtained by a simple setting, and any right- or left- hand tap, up to 43" long, with 2, 3, 4, 5, 6, 8 or 10 flutes can be sharpened.

Rotation of work is automatic. This is accomplished with a separate motor mounted behind work head which revolves work thru a chain of gears. The gears may be disengaced easily for hand operation. Power longitudinal feed for wheel head is obtained by engaging lead screw on carriage.

A locating device locates tap flutes in the proper grinding position. A wheel trueing device is also provided. This may be positioned anywhere along pivot bar, and, after being locked, wheel is fed past the diamond for trueing.

By simply equipping the machine with standard Blake bushings, any taps in the range covered by the standard Blake No. 1 and No. 2 grinder can be sharpened on the chamfer, thus this special machine may be used for standard work at any time. It may also be used for grinding countersinks, the lead on reamers, 3- and 4- flute drills, step drills, and many other tools requiring relief on the point.

The No. 4 machine is regularly supplied with two 110-volt, 60-cycle, single phase, a-c motors, and two 80-grit ¾"-face, 6"-diameter grinding wheels.

OPTI-LOCATOR

A new simplified optical device for use in centering and measuring problems on all types of machine tools is announced by the Benton Co., 351 S. La Brea Ave, Los Angeles 36, Cal. Primary uses include: Locating layouts, work edges, lines or punch marks to any revolving spindle axis; measuring die cavities or other dimensions inaccessible to mechanical measuring devices; accurately aligning a rotary table axis to a machine tool spindle; centering a spindle axis equi-distantly between opposing faces of a vee block for machining circular stock; locating centers of holes from which measurements are to be taken, etc. May be used on any machine tool with either vertical or horizontal spindle.

Opti-Locator construction is simple. A standard ½" hardened steel shank is furnished for ease of chucking with standard collets, tapers or other adapters. Pivoted to shank by two small bearings is a 7/8" tubular body which is adjustable laterally by means of a fine threaded "line-up" screw. This adjustment compensates for any spindle run-out present in machine and assures exact location of axis of

rotation.

AUTOMATIC STAKING MACHINE INCREASES PRODUCTION With Unskilled Manpower!



Outperforms conventional Riveters on numerous jobs.

A shortage of skilled workers won't upset your staking machine production if you use the Automatic Staking Machine which, even in unskilled hands, is fast, accurate and thoroughly dependable.

Uniform blow of hammer makes it ideal for riveting movable joints; can be quickly and easily adjusted for various jobs.

Available in Three Sizes

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Stroke	***************************************	2"	2"	21/2"
Spindle Throat	***************************************	1"	12/2	11/4"
Throat	Depth	49/4	4.74	8/2

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WRITE FOR CATALOG

WILLEY'S CARBIDE TOOL CO.

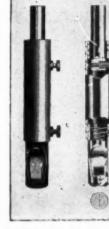
SOLE MAKERS OF WILLEY'S METAL

1342 W. Vernor Highway

Detroit 1, Michigan

Telescoping within tubular body is the optical assembly tube, which can be raised or lowered to obtain focus, and then locked at desired height. Focusing is not critical and is most quickly accomplished by inserting metal spacer provided between workpiece and optical components. Scribe lines, punch pricks or other marks on work are enlarged by and viewed thru lenses clamped by spring pressure to upper prism faces. Images are refracted thru prism and are viewed from the side at a normal reading distance. The effect is the same as sighting a mag-

nified image of the work thru exact center of spindle. Due to the large optical windows, average room light is generally sufficient for all applications; however, if desired, auxiliary light can be directed in either or both optical windows. Machine controls are within easy reach of operator at all times.







Save floor space, save power, and eliminate line shaft expense by installing MODERN MOTOR DRIVES in your plant. All drives are ball-bearing equipped and designed to fit practically every machine tool. Soundly engineered for long life.

MODERN MOTOR DRIVES DIV. NICHOLS ENGINEERING CO.

2400 W. MADISON ST., CHICAGO 12, ILL



ELECTRIC ETCHER

SPECIFICATIONS—Navy bronze contact plate; Aluminum alloy case 4" x 8" x 10"; Weight 22 pounds; Racessed, heavy duty heat selector switch and pilot light; Handy cord sterage compartment; Special design etching transfermer for operation on 110-valts A.C. with the patented offset stylus that stays eool. Fully guaranteed, Price \$67.50.

R. B. ANNIS COMPANY 204 E. 11th St. Indianapolis 2, Ind. Announcing

MIDGET AIR CLAMPS

Horizontal and Vortical!





lbs. They'll save countiess man-hours in assembly operations involving welding, riveting, bolting, etc. Advantages over mechanical by single master valve. 2. Easily installed in cramped corners. 3. Equal ram pressure at any stroke point. Send for new Mead AIR POWER Catalog, describing our line of Air Clamps, Air Vises, Air Presses, Work Feeders, Valves, Controls, etc.

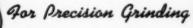
MEAD SPECIALTIES COMPANY

4114 N. KNOX AVE. DEPT YA-125 CHICAGO 41, ILL

PARKER - MAJESTIC

NEW MODEL "B" INTERNAL AND EXTERNAL

CYLINDRICAL GRINDER



With increased length between centers of 24"-new electrical controls — increased coolant capacity — larger and sturdier base.

DESCRIPTIVE CIRCULAR ON REQUEST



RKER-MAJESTIC

PARKER - MAJESTIC

DETROIT T. MICHIG

New Britain UNIVERSAL VISE

THE ORIGINAL



NEW BRITAIN TOOL & MFG. CO. NEW BRITAIN, CONN., U. S. A.



posite window indicates total spindle

Splitting the total apparent run-out exactly in half by means of the Opti-Locator "line-up" screw locates exact axis of spindle rotation. Accuracy of this adjustment can be determined by again rotating spindle 180° and viewing image. When reticle and workpiece line coincide when viewed from either window, accuracy is proved and no further adjustment is required. Spindle should then be rotated 90° and the remaining crossline adjusted by table movement only to coincide with reticle. Centering is thus accomplished from both transverse and longitudinal directions.

With the advantage of the magnified images, visual centering to an accuracy of .0001" is a matter of moments alone. However, the Opti-Locator is not restricted to such critical precision—time and labor being saved even on wide latitudes of tolerance. The Opti-Locator is removable from machine for chucking tools without altering machine adjustments. Run-out in machine does not affect centering accuracy since any spindle deviation follows a true circle, the center of which is located by the Opti-Locator.

Measuring approximately 5" long by 7/8" O.D., the Opti-Locator can be conveniently carried in any tool kit. A cap is provided, fitting over reticle when not in use, and instrument is packaged in a round plastic container.

DATUM BLOCK

The Datum Block is an accessory which increases utility of the Opti-Locator. Made by The Benton Co., 351 S. La Brea Ave., Los Angeles 36, Cal., it provides hairlines by which the Opti-Locator can be aligned to any finished edge. It centers vee blocks and similar fixtures to a spindle for machining circular stock and may also be applied with gage blocks for simplifying inspection problems. Since the true axis of any spindle rotation is constant, it can be readily used as a zero point for measuring. By aligning this axis with any desired starting point, using the Opti-Locator and Datum Block, accurate measurements can be made and setups repeated at any time.

The Block is of solid, one-piece, hardened and ground tool steel, having cylindrical sides and measuring 13%" overall length by 1" O.D. The 1" square working surface lies in a plane exactly splitting the central axis of the block. The shoulder drop is approximately 3%", adapting it for use with standard 3%" thick gage blocks. Three surfaces, all in different planes, are scribed for sighting with the

Announcing "B" and "C" Series



Eight new sizes have been added to the DIALSET line. Minimum boring diameters now range from \(\frac{1}{2} \) to 4". Dial gives micrometric adjustment in .0005" graduations. Tool is quickly set, on the job, to exact finish cut. New Bulletin N-1 completely describes DIALSET Tools; gives prices and specifications of A, B and C series, comprising three adapters and twelve inserts. Write for it now and learn how to save set-up time for precision work on all kinds of drilling and boring machines, screw machines and automatics.

STATE MFG. & CONSTR. CO.
1949 N. DIXIE HIGHWAY • FRANKLIN, OHIO

A MIGHTY MITE....

The Ingersoll-Rand Coolant Pump

It is hard to believe, but in one day a coolant pump handles liquid equivalent to 10,000 times its own weight. It has a mighty important job to do because a continuous supply of coolant is a necessary part of many machining operations.

Ingersoll - Rand coolant pumps stay on the job, whatever the conditions. There is a complete range of sizes and types. Ask the nearest Ingersoll-Rand engineer for complete details.



A 1 ¼-KRV-¼ coolant pump installed on a turret lathe.

Y₄ and 1 inch sidewall mounted type for capacities to 50 gpm and heads to 20 ft.

> 3/4 and 1 inch immersion type for capacities to 60 gpm and heads to 40 lt.

Ingersoll-Rand

9-601

STEEGE MOTOR DRIVES FOR DEFENSE GUARANTEED FOR FIVE YEARS

No chance of breakdown, doing a

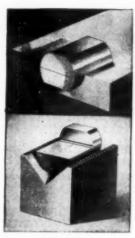


good job powering machines for defense production. No noise. floating cone, results 100% power. 8 years of production

proof of durability. Easily installed. PRICED AT \$40. AND UP. FOR LATHES, SHAPERS, MILLERS, ETC. IMMEDIATE DELIVERY. Send for descriptive pamphlet.

W. L. STEEGE MACHINERY CO. Chicago, III. 100 So. Jefferson St.,





Opti-Locator. One hairline is on top surface in the plane of the shoulder stop; another on end surface in plane of the working surface. These two hairlines permit use of the Datum Block in either horizontal or vertical positions for locating edges. A third hairline is on the working surface centrally located between the cylindrical sides. It accurately splits the distance between opposing faces of the vee block, assuring precise centering of a spindle to a vee for machining circular stock.

COATED ABRASIVE HANDBOOK

Mechanics, engineers, shop men, and other users and buyers of coated abrasives will find a new handbook, entitled "Coated Abrasives", gives the facts they need to know in order to specify coated abrasives correctly. This 36-page book covers the entire subject in a frank, impartial manner. It deals only with facts applying to the entire industry.

The handbook is written by E. B. Gallaher, a leading coated abrasive engineering consultant. It gives up-to-date and authoritative information about abrasives in use, the difference between technical and non-technical abrasives, the several kinds of backings, coatings, grain sizes and on what jobs each should be employed.

Details are provided on how to store coated abrasives in ways that retain maximum strength and work value. Vital questions on how to order so that you get what is required, and hundreds of other questions, are thoroly discussed and answered.

Copies may be obtained without charge by writing to the publishers, Clover Mfg.

Co., Norwalk, Conn.

CINCINNATI MILLING ACQUIRES LATHE COMPANY

Incorporation papers were filed in Columbus recently for a new Cincinnati concern, Cincinnati Lathe & Tool Co., with an authorized capital of \$100,000. The

AMC Quick
DEMAGNETIZER



A necessity where machine tools are used.

Standard units available and special sizes to order.

Write today for descriptive circular.

ALOFS MFG. CO.

629 Madison Grand Rapids, Mich.

new company has acquired the land, buildings, machinery, designs, inventory, unfilled orders, and trade name of the Cincinnati Lathe & Tool Co., Oakley.

The new company is a subsidiary of The Cincinnati Milling Machine Co., but will be entirely independent in operation. The property of the new Oakley concern adjoins that of The Cincinnati Milling Machine Co., and The Factory Power Co. The Cincinnati Lathe & Tool Co. has discontinued manufacturing operations because of the retirement of president W. C. Heindel. Manufacture of "Cintilathes" in sizes from 14" to 32" will be continued by the new company management.

New officers are: Millard Romaine, President; E. W. Mueller, Secretary-Treasurer, President Romaine has already announced an increase of working schedule to 50 hours, effective immediately.

CLARK COUNTERBORE SETS

To save production time, save space, and cut tool inventory costs, Robert H. Clark Co., 9330 Santa Monica Blvd., Beverly Hills, Cal., announce a set of 4 adjustable Counterbore Spot Facers with exceptional cutting range, identified by the number CS-IH. These four tools cut any fractional or decimal diameter within ¼" to 13½" OD. Each one is quickly and easily adjustable to a wide range of sizes Model No. 43B-H has a cutting range from 1" to 1¾" OD.; No. 42B-H covers the range from ¾" to 1"; No. 41B-H has a cutting range from 9/16" to ¾"; and No. 40-H cuts from ¼" to 9/16" OD.

These Spot Facers are designed to meet today's demand for greater surface speeds—chip clearance allows faster feed and rpm speeds. Holes may be counterbored to any depth. Unique cross-lip or shoulder prevents burrs from forming around edge of pilot hole and eliminates galling

5000 SIZES Files SHAPES AND SWISS FILES

Ask for Catalog WF

The most complete catalog of its kind. Lists 5000 different shapes, sizes and cuts of GROBET Precision Swiss Files.

Ask also for catalog WM on files for filing machines.

Learn more about these Chrome Steel Files that have won a reputation for utmost precision and durability.

GROBET FILE CO. OF AMERICA, 421 Canal St., N. Y. C.
PLANTS: NEW YORK • CHICAGO • LOS ANGELES

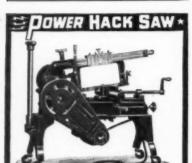


CUB

VARIABLE SPEED TRANSMISSION

For "A" section V-belts...3.3...1 speed range...perfect belt sligmment in all positions. Priced so low that no shop or machine need go without infinite speed selection. See your dealer or write 16.50 (3 Types-8 sizes to choose from)

Standard Transmission Equipment Co.
3409 VERDUGO ROAD LOS ANGELES, CALIF.



Low Priced Self-Contained Portable Sturdy

Ready to Work—Economical
EXPORT DEPT.
HILL SO, FERRY BLD'G,
NEW YORK 4, N.Y.

Write for Bulletin No. 200

BURR KEYSEATERS



Mill keywaya in the run or on the ends of shafting already erected — save money on alteration, erection, and repair work.

Made in 4 sizes, for hand or motor operation.

Write for Bulletins and prices.

JOHN T. BURR & SON 429 Kent Ave., Brooklyn, N. Y. and binding. Pilots are hardened and ground. High-speed steel blades can be quickly and easily sharpened or replaced and are always obtainable from mill supply distributors.



Each Clark CS-1H Set contains, in addition to four counterbores, an assortment of 11 extra pilots, all mounted in convenient wood crib box. Cast Alloy blades are available for all counterbore sizes.

METAL SAWING HANDBOOK

"Handbook of Metal Sawing," a 48-page book in full color, has been published and is now being distributed by W. O. Barnes Co., Inc., Detroit 14, Mich. The book is an up-to-the-minute treatise on metal sawing in industry, and contains several pages filled with general recommendations on the use of hand and power hack saws, together with instructions on the operation and adjustment of metal-cutting band saws.

The handbook tells the complete story of Barnes hack saw blades and band saws, with sizes, full specifications, prices, etc. Many tables of "Recommended Teeth and Speeds relating to hand and power hack saws and conventional and skip tooth band saws, specification tables with saws required for the various makes of band saws, and other tables provide useful data.

Special attention is paid to narrow width and skip tooth band saws for high speed cutting of soft non-ferrous alloys and plastics, compositions, fibers, woods, etc.

ERRINGTON MECHANICAL LABORATORY

STAPLETON, STATEN ISLAND 4, N. Y.

4701 N. SIOUX AVE., CHICAGO

Fixed-Center Auto-Reverse Multiple Tapping Heads

MULTIPLE HEADS

ADJUSTABLE MULTIPLE
SPINDLE DRILLING HEAD

All Parts
Fully
Enclosed
to Insure
Pressure
Lubrication
and
Rigid
Support of
Adjustable

Spindles



Help Increase Production use the

This light, easily handled instrument when used by machine operators, or on final inspection, serves to increase production, reduce scrap and assure a more uniform product. It is a reliable, precision indicator designed for rapid, convenient and accurate measurement of internal diameters. The scale range is: Plus or minus 0.001" graduated to 0.0001" and minus 0.020" graduated to 0.0001".

It can be set to any required size direct from Johansson Gage blocks or master ring.

SWEDISH INTERNAL INDICATOR GAGE

SWEDISH GAGE CO.

OF AMERICA

8900 ALPINE AVE. DETROIT 4. MICH.

NO. 2 VAN NORMAN HORIZONTAL MILLING MACHINE

A new No. 2 Heavy Van Norman Milling Machine is designed especially for a wide range of production and general purpose milling applications. Many new engineering features have been added to make definite contributions to faster, easier and more accurate operation.

Column and base are heavier and larger with scientific internal ribbing to assure solid rigidity for the heavy duty spindle, spindle transmission as

well as knee.

An important feature is a heavy large diameter flywheel mounted on inside of column assuring smooth, uniform application of power to cutter.

Cutter spindle is exceptionally large in diameter and is mounted on double-opposed Timken bearings at front, double Timken in center and straight rollers in rear. The new spindle transmission incorporates wide face hardened alloy steel gears mounted on multi-splined shafts rotating on taper roller bearings.

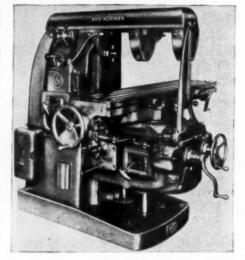
Front and rear directional control of all power feeds, actuated in the direction of desired movement, permit operation from front or rear position.

Manual hand feeds are provided in both front and rear of miller providing ease of lining up work.

Van Norman single lever speed and feed selectors provide quick, easy selec-

tion of 18 speeds and 18 feeds.

The improved ram-type overarm is large and has dove-tail bearing on col-



umn with locking means on front and rear of column. A pilot wheel enables quick positioning of overarm.

Other important features include conveniently located spindle operator lever, is easily positioned for front or rear operation; safety devices in knee to eliminate strain on any unit of mechanism should any feed overload occur; large diameter feed screw; automatic lubrication; hardened alloy steel gears and shafts; large dials graduated in thousandths and multi-splined shafts operating on anti-friction bearings.

DOUBLE YOUR DRILL PRESS CAPACITY

Minutes are Seconds with the new TWISTITE Vises. Open to full capacity in one second. Speed Defense Production with these New Vises.



J. A. RICHARDS CO., Kalamazoe, Mich.

We also manufacture

MULTIFORM Bender-Cutters for producing

brackets and fixtures from flat wire, etc.

MULTIFORM PRODUCTS ⇒

Ask about our machines and service.



The No. 2 heavy has a table 58 x 13". Drive motor is 7½ hp. Longitudinal range 28"; cross 10" and vertical 17". 18 speeds are available from 30 to 1500 rpm; 18 feeds from 3%" to 32". Miller is available with plain or universal saddle. Universal saddle permits table to be swiveled 45° to right and 45° to left.

PROTECTED-TYPE MOTORS



With the addition of three new frame sizes, designated as BSs-A, B and C, the Crocker-Wheeler Division of Joshua Hendy Iron Works, Ampere, N. J., now offers a complete line of a-c, squirrel-cage, protected type motors from 1 to 200

hp. Priced the same as the conventional open type and rated 40 C rise, full-load continuous duty, with a 15 per cent service factor, these motors provide full protection against dripping liquids, falling metal chips and other foreign matter.

Sizes built in NEMA standardized frames, 203 to 326 inclusive, have no openings in frame or shields above horizontal center line. NEMA standardized frames 326 to 505 as well as the three, newly added, larger sizes are basically the same in construction with addition of two shielded, air exhaust openings in upper half of frame. Design of these openings precludes possibility of falling liquids, etc., entering motor.

The Company's patented centrifugal bearing seal is used in all ball-bearing machines. This seal permits use of softer grease for better lubrication and longer bearing life.

Alucast rotors, in which bars, fans and end rings are cast in one operation from aluminum alloys, is employed for sizes 203 to 404 inclusive. Rotors of larger sizes have copper bars with brazed on fans and end rings. Stator coils of all sizes are protected by Vinylastic insulation. Illustration shows the largest and the smallest models of the line.

YOU CAN'T GRIND SMALL DRILLS ACCURATELY BY HAND BUT — IT'S A MECHANICAL CERTAINTY WITH A

BLACK DIAMOND DRILL GRINDER



FOR SMALL GAUGE AND FRACTIONAL DRILLS

O NE Black Diamond Drill Grinder, in any average Plant, will meet all production demands for accurately ground Small Drills.

On this motor driven machine, any laborer quickly becomes a skilled operator . . . can produce quantities of sharp drills, ground to perfection . . . with lips of uniform length . . . correct angle . . . proper clearance for accurate drilling.

Black Diamond Grinders cut grinding costs . . . secure expensive drills . . reduce breakage . . . release skilled labor for more important work . . . and the Web Thinning attachment efficiently cares for Notched, Colton, or Crank Shaft Points.

If you use small drills, singly or in gangs—you are losing time and money unless you have a Black Diamond on the job.

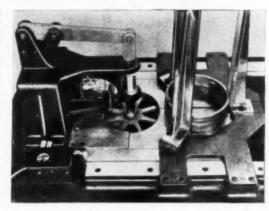
BLACK DIAMOND SAW & MACHINE WORKS, INC.
45 NORTH AVENUE
NATICK, MASSACHUSETTS

SHEFFIELD AUTOMATIC PISTON RING CHECKER

What is claimed to be the first gaging machine for the full automatic checking of piston rings is announced by The Sheffield Corp., Dayton, Ohio. It provides many advantages to piston ring manufacturers, makers of automobile and aircraft engines and the general public who use motor cars or air transportation.

positively classified so that rework costs are lowered. Rejected rings are definitely known to be below acceptable standards.

The Sheffield model illustrated with



cover removed, is a single purpose machine for automatically checking oil rings of 1.08" thickness and compression rings of ½" thickness, both of which have an outside diameter of 5.750". Gap in both rings is .070" wide, with a tolerance of plus and minus .0035". The compression ring is tapered, while the oil ring has a profiled periphery. Machine will check an average of 1500 of these rings per hour and can be adapted to other sizes and types of piston rings by changing various elements of the tooling.

Machine segregates piston rings into three groups—(1) acceptable periphery and gap. (2) reject gap and (3) reject periphery because of failure to meet requirements. Entire checking and separating operation is done automatically, the operator having but to load rings into feeding device. Electronic circuits, photo-electric cells, micro-switches, solenoids, and relays are incorporated in the automatic cycle to actuate gaging and selector devices.

The automatic cycle starts with the feed slide moving to rear, selecting bottom ring from the stack and carrying it into gaging position formed by the 180° arcs in both feed slide and stationary compression plate. As slide and compression plate come together (piston ring is compressed so that gap is closed and width of gap determined. A deviation of .001" from the master can be detected.

Vertical feed spider then descends onto

BROACHES

Converted, Reconditioned, Sharpened. Prompt service on sharpening.

> Manufacturers of Broaches

Reconditioning, salvaging and converting high speed and carbide tipped metal cutting tools.

CONANT TOOL & ENGINEERING CO.

the piston ring, pushing it into a constantly rotating master ring. Rollers on ends of spider fingers assist in properly positioning piston ring opened to its normal operating position. A concentrated beam of light projected thru an optical system scans outside periphery of piston ring where it is in contact with master ring while it makes slightly more than a complete revolution.

If the ring is not sufficiently light-tight at any point on periphery, light penetrating thru the clearance between piston ring and master ring energizes a photoelectric cell which in turn sets up a holding circuit by means of a relay. This relay is not energized if piston ring is acceptably light-tight and check is accurate to within .0017"—i. e., a clearance of .0002" will be accepted, while .0003" will cause ring to be rejected. The device can be set for the tolerance desired.

The inspected ring revolves with master ring while feed slide returns to original position, picks up another ring and carries it thru the gap-changing operation. Then as this second ring is injected into the revolving master ring, the previously inspected ring is ejected onto two solenoid operated selector shutters

or trap doors. If ring is acceptable, both shutters remain closed, and ring slides on thru and out front of machine onto a rack.

If the ring is a reject because of either periphery or gap, selector shutters permit ring to fall by gravity into reject stations on sides of machine. A springloaded clutch throws driving mechanism out of gear should machine jam due to piston rings being laced together while loading into feeding mechanism.

MAGNE-BLOX BULLETIN

An 8-page folder entitled "Speed Surface Grinding Set-Ups" is profusely illustrated with actual applications of Magne-Blox products employed to hold various types of work for surface grinding operations which may aid in solving holding problems that are constantly coming up in the grinding department.

Featured also is a new service, namely, the production of special sizes of Magne-Blox Parallels; V-Blocks and Angle-Irons, as well as other shapes and forms to fit any type of magnetic chuck. This folder on grinding is available without charge from the George Scherr Co., 198 Lafayette St., New York 12, N. Y.

DRILL JIG

BUSHINGS

A.S.A. STANDARD types and sizes in stock for immediate delivery.

Excellent delivery on NEW GAGES and GAGES salvaged by HARD CHROMIUM PLATING.

Write today for particulars



ECONOMY TOOL & MACHINE CO.

MILWAUKEE 14,

WISCONSIN

BREUER ELECTRIC MARKER



A new electric marking unit, light in weight, easily portable and operating at high speed, is announced by the Breuer Electric Mfg. Co., 5118 Ravenswood Ave., Chicago 40, Ill. Weight of marker is only 8 ounces; length is 6"; cutting stroke is 7200 per minute, imbedding a series of fine dots forming a solid line cut into material or tools marked, leaving a permanent marking.

Barrel of marker is gripped like a pencil and writes in the same manner. Simply switch on current from any a-c outlet, adjust depth of cut by turning adjusting nut, and write numbers, letters or names into the surface of tools, dies, parts, or finished products, whether material is of steel, bronze, iron, plastics, porcelain, marble, lead or glass.

Entire unit is self-contained, ready to use, including hardened alloy point, as standard, or can be provided with diamond point for cutting extra hard surfaces.

BLACKSMITH'S POWER HAMMER

"The Mechanical Blacksmith's Helper" is the sub-title of a new bulletin, smart-ly printed in orange and black, describing the McKiernan-Terry Blacker Power Hammer. This sub-title aptly explains the purpose for which this direct-geared

Save hands with Strand's SWEEP SAFGUARDS

With the Strand Sweep double cam action, you obtain proper sweep movement that prevents accidents. Operation of Safguard from press head provides additional safety in case of screw or other breakage.

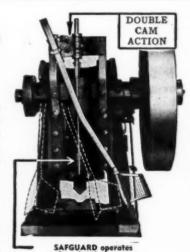
Send for Circulars on Strand Sweep and Enclosure Safguards

STRAND MFG. CO.

Safety Engineers

607 W. Lake St.

Chicago 6, III.



from head of press

electric-power-driven hammer is intended-to enable one smith alone to handle any hand-forging operation without help-

The bulletin gives detailed description of the hammer's design and construction with its specifications, supplemented by a concise tabulated list of the advantages and savings claimed for it. Photographic views of the hammer in several positions are shown.

A section devoted to installation and operation shows a complete, characteristic set of anvil tools, all of which may be made by the smith himself using the Blacker Hammer.

Copies may be obtained on request for Bulletin No. 56 addressed to McKiernan-Terry Corp., Park Row Bldg., New York 7. N. Y.

BANTAM BULLY AIR HAMMER

A small, powerful pneumatic hammer, delivering some 13,000 blows per minute and operating on less than two cubic feet of air at 80 to 100 psi, is now available for general distribution, announces the manufacturer, Superior Mfg. Co., Public Square Building, Cleveland 13, O.

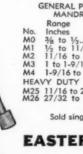
Weighing less than two pounds, the



hammer, appropriately named the Bantam Bully, fits easily in the hand. It has a pistol grip handle and a valve control in pistol trigger position.

Tools for the hammer, of which a wide variety are available, are loaded in a quick acting ball-and-channel locking chuck. A quarter-turn of the knurled nose of the chuck locks or releases any of the tools. The Bantam Bully hammer has but one moving part, the piston striking member, which is precisionfitted in a finely ground cylinder. Travel

BARGAIN ... EXPANDING



Ronge
No. Inches Price
M35 1 to 1-9/32\$12.50
M36 1-9/32 to 1-9/16 14.00
M45 1-9/16 to 2-1/32 20.00
M46 2-1/32 to 21/2 22.50
M5B 21/2 to 31/4 44.50
M5C 31/4 to 4 44.00
M55 31/4 to 43/4 89.00 M6B 4 to 43/4 70.00
M6C 43/4 to 51/2 76.00
M5 21/2 to 4 68.50
M6 4 to 51/2100.00

Sold singly or in sets. Packed in metal boxes.

EASTER! TOOL SUPPLY CO.

"Tools of Distinction"

New York 13, N. Y. 176 Grand St.

SEND FOR OUR CATALOGUE

MANDR Range

Inches

3/8 to 1/2

1/2 to 11/

1 to 1-9/1 1-9/16 to

of hammer piston is approximately %" and normally operates between 12,000 and 14.000 blows per minute, depending upon the trigger regulation and the air pres-

sure available.

Uses for the tool include cold chiseling of metals, peening, welding flash strip-ping, light scaling, light riveting, form-ing and finishing, routing of all kinds, paint and rust removal (particularly good on jobs such as steel stacks and walls) star-drilling cement, caulking, template marking, loosening stubborn threaded fastenings by vibration, fender work, wood gouging in pattern marking and many special driving, cutting and vibrating jobs in electric motor and small machinery assembly. Distributor territories are available.

CARBON ELECTRODE HOLDERS

"A complete new line of air cooled Carbon Electrode Holders for manual welding is announced by Tweco Products Co., Wichita 1, Kansas. The line includes four sizes, 150, 200, 300, and 500 "Hol-Grip" ampere models. Positive design with ample length and ventilation

are features of this new line.

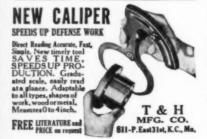
The average carbon arc welding job is done with either the 13½ ounce 150 ampere holder or the 20 ounce 200 ampere unit. These two units are furnished optionally with or without special "Quick-Attach" Whip Cables for short duration jobs. The 300 and 500 ampere models are suitable for heavy welding, and cutting jobs.

Form No. CH-100 describes fully these new holders, giving complete quantity

price and parts information.

POPE'S 25TH BIRTHDAY

Machinery Corp., Haverhill, Mass., recently celebrated the completion of a quarter century of business life at



a company dinner at which Francis Healy, chief engineer of the automotive division of the Van Norman Co., was the guest speaker. Mr. Healy told of the part Pope spindles had played in grinding of crankshafts for motors used by Army transportation trucks in China and of the use of Pope Spindles on Van Norman machines in Russia and South America and all parts of North America. Mr. Healy served as a lieutenant colonel of Army ordnance during the war.



Lyman B. Pope, founder and president of the company traced its growth from an idea to an organization for precision production that delivered thousands of spindles, radar parts and special aircraft engine milling machines on schedule for vital war production. Tolerances within a ten-thousandth of an inch were achieved on much of this work. "Pope Precision Spindles", said Mr.

Pope, were employed in grinding small bombsight bearings, aircraft engine bearings, tank bearings, gun parts, tools and gages, lenses and many other essential precision parts. Among the most significant developments was that of the sealed lubrication spindle. It is estimated that in two war years alone these spindles saved 192,000 gallons of oil and more than half a million man hours that would have been required for external lubrication.'

The Pope organization has been and continues to be an active and important factor in the constant improvement of surface finishes as well as the develop-ment of sealed lubrication.

A number of veteran employees were presented with watches as a mark of appreciation of their long time service.





East Shore Mach. Prod. Co.

835 East 140th Street - Claveland 10, Ohio, U.S.A.

19326 Woodward - Detroit 3 Mich.



MILLING - DRILLING - BORING ATTACHMENT OF Operations

Photo shows Rusnok head used to convert an old type milling machine into high speed, versatile, productive equipment. Uses many types of cutters on a wide range of work. Easily mounted—tilts to any angle. Large size spindle (No. 9 B & Stoper), Takes 1/16" to 3/4" end mills. Large quill with 4" travel, counter balanced, hardened and ground. Six speeds 250 to 3000 RPM, Lever and worm feeds. 1/2 h.p. motor. Specially engineered by RUSNOK to meet modern demands for high speed, high precision, heavy duty end mill operations.

Prompt delivery.

Write for illustrated Circular and Prices

RUSNOK TOOL WORKS
4840 WEST NORTH AVE. CHICAGO 39, ILL.

NEW DEARBORN FIXTURE



A new model checking and indexing fixture especially designed for use on milling machines has been developed by J. W. Dearborn, Ansonia, Conn. It embodies several improved construction features making for sturdiness and simplicity and eliminating moving parts.

A one piece operating shaft is used. The collet is easily removed from nose by con-

veniently arranged latch on side of fixture. Operation has been simplified thru the use of a 24-notched-plate to give 1-2-3-4-6-8-12-24 positions and a new simplified scale for indexing from 1 to 360°.

An extra base is furnished so fixture can be operated either horizontally or vertically.

The fixture is constructed to facilitate machining of shafts and rods for keyways, squares, hex's, etc.

The nose piece is held by friction so it can be stopped in any required position. Changeover from friction holding to the 24-notched-ratchet method of operation can be made in a minute or less.

DETAIL ENGINEERS'-GLASS

A circular describing Detail Engineers'-Glass and a Universal Layout Scale for Form Grinders has been prepared by Engineers Specialties Division of the Universal Engraving & Colorplate Co., Buffalo 8, N. Y. The engineers' glass is described as a vehicle for the exact chart drawing and layouts employed on the copy tables of form and profile grinders which incorporate precision pantographs and microscopes in their construction. The chart is translucent, with a hard

THREAD MILLING INTERNAL & EXTERNAL THREAD GRINDING LARGE HEAT TREATING PLANT

Equipped to give you production milling and grinding to a total tolerance of .0001 in.

Inquiries Solicited —

Prompt Service

C. B. CHRISTIANSEN

164 PENNINGTON STREET NEWARK 5, NEW JERSEY

sheet of thin vellum over the lined sheet. The Universal Layout Scale carries divisions of .001" at 50X magnification ruled on the under side of the selected plate glass, of which it is formed.

VARIABLE SPEED BUFFING UNIT

The Standard Electrical Tool Co., 2486 River Road, Cincinnati 4, O., announces a Type 1BVB Infinitely Variable Speed Buffing and Polishing Machine.

The 1BVB is powered by a 1 hp motor and operated by toggle switch. Thru the "Speedial" control conveniently located at front of machine it is possible instantly to obtain any spindle speed variation between 1500 and 3000 rpm.

This is said to serve advantageously in the production of small parts for either buffing or polishing at the correct spindle speed-and furthermore, as wheels wear, spindle speed may be increased for maintaining correct peripheral speed.

The unit is illustrated on bench base and is equipped with flanged spindles, but to order, can be furnished with taper spindles such as used in some production and jobbing shops. Also available in pedestal model.

The "B" dimension is 61/4", "C" 11/4",



and diameter of spindle between flanges 3/4". Height from bottom of base to center of spindle is 10" on the bench model and 39" on the pedestal model. Distance between wheels 231/2".

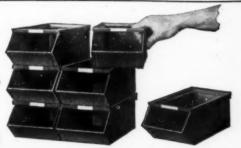
MODEL K DIVIDING HEAD

Kearney & Trecker Corp., Milwaukee 14, Wis., offers a new catalog WA12 on the Milwaukee Model K Universal Spiral Dividing Head. It is attractively illustrated with photographs and working drawings. In addition to a complete descrip-

PARTS

where you want themwhen you

want them



You'll save time, space and labor handling parts and materials when you use these patented STACKBINS. STACKBINS keep parts instantly accessible — eliminate waste hand motions — stack compactly to form units of exactly the right shape and capacity — make order filling or assembly work faster, easier, more efficient.

STACKBINS IN STACKWAC

Manufactured and sold in Canada exclusively by WALTER H. WICKWARE, OTTAWA Write Stackbin Corp., 55 Troy St., Providence 1, R. I.

"Stacked and



tion of the unit, it contains instructional information as to the operation of the attachment. Copies of this unusually effective 12 page bulletin are available on request.

BOYAR-SCHULTZ ADDS TO LINE

The Model K Knurling Tool is a new addition to the line of screw machine tools made by Boyar-Schultz, 2120 Walnut

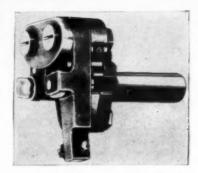
St., Chicago 12, III.
Operated from the screw machine turret, feed and pressure are simultaneously applied to both sides of the work thru cantilever action principle, to exactly the same depth at equal pressure; this action is said to avoid the transverse strains and "springing" on the spindle sometimes ex-perienced with knurling tools of other types. It is of particular advantage in knurling long parts.

One of the advantages is in knurling

between and behind shoulders when necessary. Operating from the centerline of material regardless of diameter, the us-ual disadvantage of "knurl climb" is

eliminated.

It is asserted that many knurling operations formerly considered impossible. are now quickly and satisfactorily per-



formed with this new tool. It is made in three sizes—00K, 0" minimum, 3" maximum; 0K, 3/16" minimum, 5/8" maximum; 2K, 4" minimum, 7/8" maximum.

HERMETI-COIL CHUCKS

The Hanchett Mfg. Co., Big Rapids, Mich., offers a new type of electro-magnetic chuck featuring a patented "Hermeti-Coil" said to be absolutely waterproof

DESMOND GRINDING WHEEL DRESSERS



Correct method of using Huntington Dresser.

You can increase your grinding production by dressing your wheels regularly with Desmond Dressers.

We manufacture the only complete line of dressers and will be glad to send any of them to you for trial or advise the type and size you should use.

Write today for a copy of our catalog "H" and name of your nearest dealer.

HE DESMOND-STEPHAN MFG. CO.



and shockproof. The coils themselves are sealed in completely air-tight plastic cases. The lead wires are carried from each coil thru air-tight plastic containers. Each coil is therefore a self-contained unit. A valuable construction feature is the fact that the face plate is attached separately. Thus, if the face of the chuck becomes worn thru heavy use, it may be replaced as a unit, saving the expense of purchasing an entire new chuck. This method doubly insures an absolutely air-tight chuck body.

The chucks are specially designed to withstand tremendous external pressures, especially where coolants, water or oil are used. Chucks are made from low carbon steel for greatest possible magnetic holding power.

Hermeti-Coil Chucks are made in many sizes and styles, including rotary, rectangular and revolving. Hanchett Engineers will design chucks to fit special requirements, where necessary.

NYLON RELEASED

With all allocation restrictions on nylon molding powders removed, many of the consumer uses foreseen for the plastic are expected to materialize within the next few months, the Plastics Department of E. I. du Pont de Nemours & Co., Wilmington, 98, Del., announced recently.

mington, 98, Del., announced recently. Largely confined to industrial and specialized war uses up to now, nylon plastic will soon be turning up on store counters thruout the country in the form of drinking tumblers, combs, slide fasteners, tableware, children's feeding dishes and many other articles which require its toughness, heat and chemical resistance. and various degrees of flexibility.

Five types of nylon powders are already in commercial production. Color is currently limited to the natural nylon color, a translucent ivory, but opaque and translucent colors are expected to be available commercially within the coming

BALANCING WAYS

Shops handling rotating parts find this simple, sturdy and thoroughly dependable device highly efficient for balancing and truing operations. It assures better work . . . saves time . . . saves labor. No leveling required.

Four chilled iron discs rotate with minimum friction on sensitive special bearings, giving a quick, accurate indication of whether or not the work is in perfect balance.

Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in. 40 in. 60 in. 72 in.	20 in. 30 in. 30 in. 66 in.	1,000 2,000 2,000 5,000 10,000





Send for BULLETIN 12-5



War uses included tiny coilforms for sound-powered Navy telephone headsets, valve seats for torpedoes, and the extru-sion-jacketing of insulated wire. Nylon has also been suggested for such uses as valve seats and gaskets for gasoline pumps, compressed air, gas cylinder and faucet equipment.

Nylon possesses unusual toughness and high service temperature which, under some conditions, is as high as 380°F. This temperature greatly exceeds that of other moldable thermo-plastics and permits sterilization by boiling water or steam. The plastic is practically unaffected by age and is extremely slow-burning.

ROTARY STOCK STOPS

A rotary stock stop of new design, available in four sizes for use on automatic screw machines and turret lathes, is announced by Barnaby Mfg. & Tool Co., 70 Knowlton St., Bridgeport 8, Conn.

According to the makers, these compact and sturdy stops have live heads which rotate freely with the bar stock, eliminating friction between work and stop. Thus there is no marring of finished stock end during feed; and greater uniformity in length of feed is obtained. In addition,



elimination of friction between stock and stop reduces wear in screw mechanisms: and on turret lathes it lessens operator fatigue, permitting a production increase of 7 to 15%.

The new tools are said to have no backlash and are built to withstand hard wear and repeated impact. Regularly furnished with flat end as illustrated, they also can be furnished with the rotating member made to accommodate formed or tapered stock ends. Stock stops of the latter design embody floating construction to facilitate required accuracy of alignment.

E-SPI AGNIFIER

For VERNIER HEIGHT GAGES and LATHE MICROMETER COLLARS

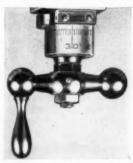
A NECESSITY FOR INSPECTORS, LAYOUT MEN TOOL AND DIE MAKERS AND MACHINISTS

Models are available for Brown & Sharpe 'visual problem, let or Starrett calipers, height gages and gear tooth verniers. Also for South Bend, Logan, Atlas and Clausing lathes.

If you have a special us cooperate in de-veloping a special veloping a special Eye-Spi model for your needs.

EYE-SPI

Priced from \$3.00 to \$4.00 Distributors are wanted. Good territories open



Just slip this clear plastic magnifier on that difficultto-read scale and . . . SEE the difference.

> _ JCES REJECTS EDS PRODUCTION ANS ACCURACY MAKES READING EASY

Mail Your PARK METAL PRODUCT Order New! PRAIRIE VIEW

An illustrated bulletin describing these and other new Barnaby tools for screw machines is available.

ELLPRO CUTTING ELECTRODES

A new bulletin on Ellpro Cutting Electrodes, for underwater or surface cutting, has just been published by Ellwood Products Corp., Ellwood City, Pa.

These electrodes were developed by Ellwood engineers and the U. S. Naval Experimental Station at Annapolis. With the end of the war, the possibilities for Ellpro Cutting Electrodes in harbor clearance, salvage and certain construction operations can now be revealed.

Ellpro Cutting Electrodes can be used with any portable welding set by simply adding a tank of oxygen. Their use under-water permits speedy, safe, inexpensive cutting at depths up to 280 feet and more.

According to the makers, for surface work, the Electrodes have been found effective for cutting cast iron and other materials. There is no need for pre-heating—the cutting action starts instantly in water or air by striking the arc. Cutting speed is usually three times faster than

possible by previous conventional methods. No experience is needed.

The new bulletin on Ellpro Cutting Electrodes gives complete details and specifications, together with a fully illustrated description on how to use the Electrodes. The bulletin also describes the Palmgren Arc Oxygen Kit for Underwater Cutting, used with Ellpro Cutting Electrodes.

COMPLETE P & W CATALOG

In view of the heavy reconversion interest, Pratt & Whitney, West Hartford 1, Conn., have prepared a new catalog. The 72 pages contain a complete list of Pratt & Whitney precision products—machine tools, Keller machines, Kellerflex, gages, small tools, and its agency sales line, all with condensed information, illustrations and specifications. The presentation is made attractively and effectively with numerous illustrations that are interesting and unusually clear in detail. Up-to-the-minute developments are apparent in each of the lines represented. To many, a review of the company's history, presented as an introduction, will be of interest.

No. 2 To No. 6

Screws Driven on this Husky but Sensitive Hopper Feed Screwdriver.

No handling of screws. Just place assembly on table, move from screw hole to screw hole. The machine does the rest.

Drives screws at one second each.

DETROIT POWER SCREWDRIVER CO.

2809 West Fort St.,

Detroit 16, Mich.



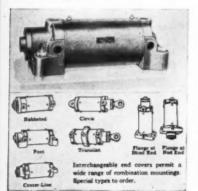
LOGAN "ROTOCAST" HYDRAULIC CYLINDERS

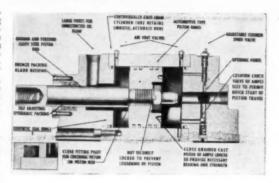
Maximum power without leakage and lasting accuracy of bore dimensions are claimed for the centrifugal-cast barrels and other advanced features of the new, improved Logan "Rotocast" Hydraulic Cylinders. A complete line of these cylinders is announced by the Logansport Machine Co., Inc., 903 Center Ave., Logansport, Ind.

The cylinders are adapted for a wide range of operations involving pushing, clamping, lifting, forcing, holding, pulling, pressing, and other power movements in any direction. They

can also be used advantageously on new or old equipment in manufacturing and processing industries, material handling and many other applications.

To fit the greatest number of applications, standard cylinders are offered in 7 mounting types, 3 piston rod models and 9 standard bore. They are available with cushioning at one or both ends if desired. Altho designed primarily for oil service, "Rotocast" Cylinders may be used for water service if the water is treated; if untreated water must be used, cylinders of special material can be supplied. These cylinders are built for operating pressures to 1500 psi.





"Rotocast" cylinder barrels are centrifugally cast from close-grained grey iron which is said to retain its original dimensional accuracy for the life of the cylinder. This permits smooth, true bores, honed to a mirror finish, and assures a uniform flow of power with minimum friction, and piston leakage. Four automotive type piston rings further contribute to positive operation with maximum power.

End covers are made of close-grained alloy cast iron, and are attached directly to barrels by heat treated socket-head cap screws. No tie rods are employed. End covers may be rotated on barrel so as to place vent ports at top, bottom or either side. Alternate pipe tap locations, tapped and plugged, are also provided.

Cover attachment holes are standard on all models. This makes covers of various types completely interchangeable, and permits a wide range of combination mountings. Standard mounting types include rabbeted, foot, center-line, clevis, trunnion, flange at blind end, and flange at rod end.

Conventional gaskets have been eliminated. In their place, soft synthetic "O" rings are used to provide permanently leak-proof seals between cylinder barrel and end covers.

Foot mounting and center-line mounting cylinders have finished mounting surfaces to facilitate anchoring the cylinders by means of keys. Keys do not lie against mounting surfaces of covers.

Small tapped holes are provided at var-

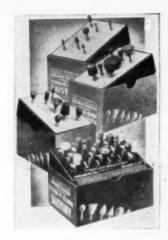
ious locations in either end of cylinder barrel. This construction permits locating air vent valves in the position which permits air to be vented or bled from the highest point, regardless of mounted position of cylinder.

ABRASIVE UTILITY KITS

A complete line of Mounted Point Utility Kits for industry, for the home workshop and for the job shop is now available.

Kit MP21 contains 20 mounted wheels and points and an Electrolon dressing stick $5 \times 5 \times \frac{1}{2}$ ", for dressing the points and altering shapes for special applications.

MP9 contains 9 mounted wheels; kits MP7A and MP7B each contain 7 points. The MP7A kit covers the smaller type points for jobs requiring finer work or presenting hard-to-get-at spots. The kits are made up of carefully selected Mounted Wheels and Points, of first grade, industrial quality materials mounted on stainless steel mandrels, 1½" long by 1½" diameter. Being usable on all high speed grinders whether air, electric or flexible



shaft, these points are highly versatile precision grinding tools. They are made by the Abrasive Co., Philadelphia 37, Pa.

WANTED TO BUY WILL PAY CASH for

Drills, Taps, Dies, Reamers, Milling Cutters, Files, Tool Bits, Emery Cloth, Grinding Wheels, Hacksaw Blades, Allen Cap Screws, etc.

Address Box B-40

c/o Hitchcock Publishing Company

542 So. Dearborn St.

Chicago 5, III.

HONORING OLD EMPLOYEES

At ceremonies held recently at their plant in Long Island City, the manage-ment of Waldes Kohinoor, Inc. honored 65 employees who have been in the company's employ for periods ranging from

10 thru 24 years.
Each of the men and women being honored was presented with a \$100 U.S. Savings Bond, and was congratulated per-sonally by Sigmund Waldes, President.

In a short talk, Mrs. Hermine Axthelm, Vice President, expressed appreciation of the company for the long and loval serv-

ices of these employees, mentioning particularly the important contributions they had made in the recent years when the plant was occupied with 100% production

of war material.

M. M. Miller, Treasurer, a veteran of 23 years employment, made a short speech of acceptance on behalf of his

fellow employees.

Employees who have been with the company for more than 25 years were honored previously. Both ceremonies mark a further step in Waldes' policy to recognize and reward long service.



Hungerford Research Corp., Murray Hill, N. J., offers a 16-page booklet explaining its services in the development of new and improved products. This or-ganization specializes in the application of powder metals and plastics to mechanical and electrical equipment, and presents an interesting picture of its personnel, methods of operation, and laboratory and shop facilities.

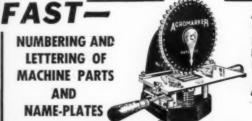
DIALSET BORING TOOLS

Bulletin N-1, of State Mfg. & Construction Co., 1949 N. Dixie Highway, Franklin, O., is the first release on the "B" and "C" series of Dialset Tools. The "A" series was announced early in the year. These tools consist of an adapter and an insert con-taining bits. The "A" adapter accommo-dates four standard inserts, the "B" adapter, five, and the "C" adapter, three. Applicable to all machines which will accommodate drills and boring bars, Dialset Tools are adjustable for precision boring a single hole or a series of holes of the same or different sizes. Dialset Tools are said to reduce tedious set-up procedures, as they perform multiple boring operations, with micrometer adjustment.



longs to a broad line of Oliver band saws and industrial and it meets all requirements for saws equipment. of this type. Let us send bulletins.

OLIVER MACHINERY COMPANY GRAND RAPIDS, MICHIGAN, U.S.A.



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WRITE FOR LATEST BOOK-LET ILLUSTRATING "100 METHODS AND MACHINES FOR MARKING."

IZABETH, N. J. 15 MORRELL ST.

ELECTRONIC AIR FILTRATION

"The Magic of Electronics in Air Filtration" is the title of a new booklet issued by the American Air Filter Co., Inc., Louisville 8, Ky. The text covers the theory of electronic filtration, the re-search and development of the process by AAF, what electronic filtration means to specific industries and how these air filters are made an integral part of any air-conditioning system. The entire pre-sentation is nontechnical, and all the illustrations are art works.

K & T MODEL C BORING MACHINE

A 16-page catalog, CMA 10, on the re-cently announced Model C Milwaukee Autometric Boring Machine has been published by the Kearney & Trecker Products Corp., a subsidiary of the Kearney & Trecker Corp., Milwaukee. Illustrations and detailed explanations

covering outstanding features, operating data, applications and setups, complete accesories lists and specifications make it a fine informational and working guide book

ATTENTION GAGEMAKERS!

WE ARE REDUCING OUR HUGE TAPERLOCK PLUG GAGE STOCK. Buy your gage blanks now . . . made of Carpenter's Oil Hardening Tool Steel, Rockwell 62-64. Send for new price lists today, showing large savings.

We also carry in stock aluminum gage handles, polished or in colors, locking screw assemblie, insulating grips and trilock blanks.

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Spur and Spiral Gear Hobs, Spline Shaft Hobs, Worm Gear Hobs, To Class B Limits: Involute Gear Cutters. Special Form Milling Cutters, Thread Milling Cutters, Multiple or Single in Class 1, 2, or 3 Fit, Jigs, Dies, and Fixtures.

U. S. MACHINE TOOL MFG. CORP.

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TELEPHONE 85

HOW L-R



Half of cushions idlers. (except reversing load). Always new set in coupling. Easily changed without tearing L-R Type "W" shown, Duties 2 to 2500 H.P. Most efficiently correct misalignment, pro-

tect machines.

Send for L-R Catalog and Selector Charts.

LOVEJOY FLEXIBLE COUPLING CO. 5026 W. LAKE ST. CHICAGO 44, ILL.

SCHAUER SPEED LATHE "NAO"

Featuring design refinements that make for new ease of operation, greater convenience of operation, and choice of operating sequence thru simple, accessible adjustments, this small, light-duty Speed Lathe is designed for speedy, economical general finishing operations on small metal and plastic parts.

Hand operating lever may be set on right or left hand side of lathe, and in either vertical or horizontal position, whichever operator finds is most convenient. Only five pounds pressure on lever is required to open collet. Simple adjustment affords operator choice of two operating sequences:—In one, operating lever opens motor circuit, applies brake and opens collet. In the other, motor operates continuously, brake is locked out, and operating lever is used only to open and close collet.

Motor is single speed, 3450 rpm, ¼ hp for 220-440 volts, 60 cycles, 3 phase. Machine is designed to use type 3C collet with maximum capacity for ½" round stock, and can also be equipped with 3", 3-jaw, light-duty chuck. ½" clear hole

thru spindle permits rod or bar stock or long work pieces to be handled. Compact, complete, ready to operate, this light-duty speed lathe incorporates all the highquality construction features of the standard speed lathes.



Made by the Schauer Machine Co., 2064A Reading Rd., Cincinnati, Ohio,

. . . unskilled labor can grind straight and spiral flutes

FULLY AUTOMATIC PRECISION GRINDING

- * sharpens milling cutters
- ★ grinds flutes in small taps and reamers from solid
- * sharpens angular cutters
- ★ sharpens small saws in gangs up to 3¾" long

Wide range of special applications

Write for Bulletin 50 F



Automatic Universal Flute Grinder

THE WARDWELL

MANUFACTURING CO. 3165 Fulton Rd., Cleveland 9, Ohio

Save TIME and MONEY

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WITH THE

"BLANER"
Universal Hand

SPRING

Every shop and tool room needs it . . . a strong, dependable unit . . . quickly set up in any vise.

Increases production of hundreds of sizes of springs. Right and left.

Write for illustrated folder, giving complete details

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SHARON

PENNSYLVANIA

MADE OF ALLOY STEEL MILLED FROM BAR

SOCKET HEAD
CAP SCREWS



Try Them On Your Next Job!

MACHINE PRODUCTS
COMPANY

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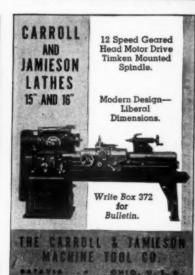


LITTELL Automatic Centering Reels are constructed with four arms which operate all at the same time. A free loop of material is supplied to automatic feed, regardless of weight of coil.

Littell Reels are made in 100-lb. to 20,000-lb. capacities. Automatic spindle and cradle types. Plain and motor-driven. Used in thousands of plants for faster production.

Other Littell products include Roll Feeds, Dial Feeds, Magazine Feeds, Air Valves, Straighteners, Scrap Winders, Pres-Vac Safety Feeders, REQUEST Mechanical Pickers, etc.

F. J. LITTELL MACHINE CO. 4153 Ravenswood Ave., Chicago 13, III.



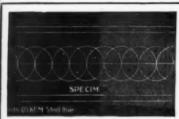
CUT TOOLING AND HANDLING COSTS



John's Jigs and Fixtures can be adapted for a wide range of jobs, saving you money in first cost, and in handling the work, into and out of the machines. These sturdy, dependable fixtures will help you reduce production costs.

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DYKEM STEEL BLUE STOPS LOSSES making dies & templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glars. Increases efficiency and accuracy.

Write for full information.

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(In Canada: 444 Pacific Ave., Toronto, Ont.)

The Tool with a Thousand Shop Uses!

Lead Hammer with "Shur-Grip" Hendle in use of Reynolds Machinery Company, Ship Street Rebuilding Plant, Providence, Rhede Island.

Johnson "SHUR-GRIP" Lead Hammer!

Day in, day out, there are countless jobs that call for a lead hammer. To save precious man hours, many times lost through costly hammer slips, equip your shap or plant thoroughly with SAFE Johnson "Shur-Grip" hammers. "SHUR-GRIP" handles give user a "buildag" grip and are almost indestructible. "SHUR-GRIP" handles used only with Johnson "SHUR-GRIP" handles used only with Johnson that the shape of the sha

"SHUR-GRIP" handles used only with Johnson 3, 4, 5 and 6 lb. lead hammers. For illustrated folder and price list, write Dept. M. T.

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The Sensational New Patented, Perforated, Continuous Roll! FIELD FLEXIBLE ABRASIVE WHEELS

Designed for precision work where flexibility is required. Indispensable for sanding and finishing . . . penetrating recesses, lapping holes in dies, finishing various shapes of metal, wood, rubber and plastic. Used for finishing propellers in aircreft plants. WRITE FOR DESCRIPTIVE BULLETIN AND SAMPLE. Prompt deliveries.

FIELD ABRASIVE SPECIALTY
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Eliminate Gage Cost with the New SCHNACKE Adjustable FLUSH PIN GAGE

An accurate flush pin depth gage, quickly adjustable for hundreds of uses and various types of parts. Besides the various combinations possible with each pin (3 sizes are furnished) extra anvils are available so that it may be used for depth gaging almost any part. Tolerances are adjustable on the Micrometer screw from plus or minus .001 to .200. Gage is simple, easy to set and locks firmly. It will save money for you.

Open territory available for manufacturers representatives.

SCHNACKE MANUFACTURING CORP.

1018 E. Columbia St. Evansville, Ind.

"DUPLEX" Nut Slotter!

Adaptable to Milling of parts of various shapes and sizes . . .

SLOTS 2 SIZES AT ONCE. TWO CONTINUOUSLY OPERATING CONVEYORS. AUTOMATIC BURR REMOVAL. AS HIGH AS 3000 SLOTED PARTS PER HOUR.



PELLOW MACHINE Co.

13510 FOLEY AVE., DETROIT 27, MICH.

GRINDING WHEEL DRESSER

An improved type of universal grinding wheel dresser is designed for reproducing template forms as well as cutting angles and radii. The dresser, designated as No. 41, will accurately reproduce any number of times, template forms up to 1\%" in length, cut angles at any degree, and produce both convex and concave radii up to 1".

The makers emphasize that it is heavily constructed to permit heavy as well as fine cuts with extreme accuracy, with-out chatter or vibration. Its design provides for setting with size blocks for radius dressing and with a sine bar for angle dressing when a higher degree of accuracy than can be obtained with regular calibrated base dial is required.

To cut a wheel at any angle, it is only necessary to set calibrated dial at required angle, place dresser on magnetic chuck, banking side required against backing guide strip on chuck, and simply push body of dresser in either direction by hand. Dresser slides easily on ground guide shaft. For extremely close angles, dresser can be set with a sine bar by replacing diamond tool with an indicator.



For radius cutting, diamond tool is first positioned with a gauge to bring cutting point in correct relation with the axis of rotation of dresser. Dresser is then set to cut either a concave or convex radius by placing suitable size blocks or a calipers between either of two gauge points on base. If it is desired to cut a .250" convex radius, gauge blocks or calipers measuring 1.250" are inserted between one set of gauge points and dresser is locked in place. If a concave radius is desired, gauge blocks or calipers are in-inserted between the other set of gauge



372

Safe, High

mium vapor de-

greasing solvent.

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PHILLIPS MANUFACTURING CO.

Chicago 45, III.

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Cities

Factory Offices Quiet Telephones



Factory offices are often noisy-making 'phone conversations difficult-verbal instructions uncertain and hard to understand. Let the Burgess Scout Model No. 601 solve this annoving problem. You step inside the sound-absorbing walls and you are instantly protected by a "zone of quiet." It is always easy to hear and be heard.

Acoustically lined plywood construction-rich walnut finish-easy to install on desk, table, post, or wall.

Mail Coupon for Free Bulletin Today!

Burgess-Manning Company 2817-D W. Roscoe St., Chicago 18 Please send illustrated bulletin describing the Burgess Acousti-Booth.

FIRM NAME

AIR GRINDERS MODEL JA (Turbine Type Tool)— Takes Wheels Up To 1/4", Speed 50000 RPM, Collet 1/4", Weight 12 os. Overall Length 6%" MODEL TT (Turbine Type Tool)— Takes Wheels Up To 1¼", Speed 30000 RPM, Collet 15/64", Weight 2 lbs., Overall Length 9"

MODEL PVT

(Vane Type Tool) — A Power Tool For The Heavier Jobs Taking Wheels Up To 2½", Speed 10000 RPM, Collet 15/64", Weight 2 lbs. 4 oz., Overall Length 9"

You now have your choice of three Featherweight Kipp Air Grinders as seamerweight hipp air Urinders as All three are available for immediate delivery and priced extremely low. Order

MADISON-KIPP CORPORATION 207 Waubesa St., Madison 4, Wis.

GIRLS CAN OPERATE

NEW Rouse
HAND MILLER
FOR SMALL PARTS



One of the ROUSE Fixture Set-Ups that
Speed Production

The Rouse Hand Miller is a versatile, efficient, high-speed ball bearing machine for handling light cuts in brass, aluminum and steel.

Rouse Fixture Set-Ups make the Rouse Hand Miller readily adaptable for accurately milling small parts for planes, radios, electric motors, and similar equipment. Spindle will take milling cutters or end mills.

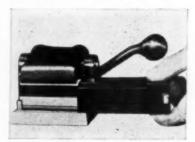
Prompt delivery can be made. Send for circular.

H. B. ROUSE & COMPANY 2214 N. Wayne Ave., Chicago 14, Illinois Template or form dressing is accomplished by mounting dresser head on a special base provided for this purpose. It is easily removed from base used for radius and angle dressing by loosening two set screws and lifting off. When positioned on template base, dresser has a floating action which is guided by an inserted template. A form corresponding to template is cut in a grinding wheel by simply turning a knob to move dresser head back and forth. Templates can be any thickness, from 1/32" to 3/16" and will reproduce forms up to 1½" in length.

The No. 41 radius dresser is manufactured by Best Tools, Inc., with Madco Products, Inc., 516 Fifth Ave., New York 18, N. Y., as sole distributor.

BAKEWELL TOOL HOLDER

The Bakewell Toolholder is designed for faster operation and more positive repeating on close tolerance engine lathe jobs. It is reported that the new toolholder has speeded production in the Bakewell plant as high as 35%, while reducing lathe scrap as much as 60.2%, allowing the holder to pay for itself within a short while.



The holder consists of a quick acting vise which is easily mounted on the lathe compound without machining, and into which Bakewell toolbit holder bars are positioned against a positive stop and held in place on hardened surfaces with rigid three plane support. The action of inserting the tool bar clears chips from the supporting surfaces of the vise and prevents misalignment.

The Bakewell Toolholder, was designed in the Bakewell plant for the company's own use, but is now being made available to the trade, and the manufacturer is seeking outlets thru machine shop equip-

NAME IMPLIES

TRU-CUT engineers have combined the sound fundamental of metallurgy with an advanced degree of skill in developing a new heat treating process of high speed steels, resulting in one of the greatest machine tool efficiency changes in tool history.

Tool Bits • Genter Drills Key Seat Cutters • End Mills Milling Cutters • Form Tools

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TROYKE ROTARY TABLES



Sizes 9", 12", 15" and 18". Ask your dealer or write us for eight page catalog.

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Jimesaver LAPPING COMPOUND

GIVE greater accuracy in fitting hard or soft metal bearings, gears, valves, slides, etc. In successful use since 1919.



TIMESAVER positively does not imbed. Compound comes in powdersed form and is mixed with oil as used. Applied to parts to be fitted, Timesaver first acts as an abrasive, then its particles progressively diminish to a polish, finally to an inert material with no cutting action.

Samples and information on request.

TIMESAVER PRODUCTS CO.
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For Smoother Cutting UNEVEN SPACING

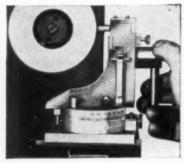


Proper clearance for easy assembly Sold in sets or separately. Specials on request,

JOSEPH B. FAKES & COMPANY
ROYAL OAK, MICH.

ment suppliers in all parts of the country. For further details address Bakewell Products Co., 2429 East 14th St., Los Angeles 21, Cal.

MODEL F RADII DRESSER



The J. & S. Tool Co., 477 Main St., E. Orange 2, N. J., offer a new "F" model designed to fill specific requirements in the form-dressing field. Altho it does embody the well-known features of the

larger Model "E" ("Fluid-Motion", .0001" accuracy, one setting for combined forms, automatic centering, etc.) it complements the uses of the larger model, rather than being merely a "smaller edition".

Form-dressing on cylindrical, internal and small bench-surface grinders has always presented problems. The Model "F" is well adapted for cylindrical grinders with spindle heights as low as 5" from base of table and accommodates wheel diameters up to 7". Its compact size is well suited to internal grinders with wheel diameters under 7". When form-dressing on small bench-surface grinders, the Model "F" will handle a variety of applications with extreme ease.

It has a 7" wheel capacity and radii range to 1½", but is only 5\%" high, with a 5" diamond-point height and a base of only 3-3/16" x 4".

EASTERN TOOL CATALOG

Eastern Tool & Supply Co., 176 Grand Street, New York 13, N. Y., has issued a complete 128-page catalog showing a full line of small tools and supplies for the machine shop. Included are drills, taps, dies, reamers, milling cutters, chucks, tool bits, gages, and precision



HAMILTON SENSITIVE TAPPER

More and Better Work With Less Effort

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NO BREAKAGE of even the smallest and finest taps ... can be used on any threadable material ... fer smallest threads up to and including 10-32. For tapping on instrument, camera, watch, business machine operations where sensitivity and precision count.



STOP

DRILL, TAP, AND REAMER BREAKAGE with BUFFALO

TORQUE CONTROL COUPLINGS

Based on the fact that torque and inertia are the fundamental principles of all drilling, reaming and tapping operations, the BUFFALO TORQUE CONTROL COUPLINGS are designed to eliminate drill, tap and reamer breakage by acting as a safeguard between the driving power and the tool.

When adjusted at a fixed torque to perform a particular operation, these couplings automatically throw out when over-loaded, thereby severing the driving power thru the coupling itself, but automatically re-engage and re-assume the driving power when the overload has been removed.

Available in production and utility models, in sizes for all operations on drilling machines, lathes, turret lathes, horizontal boring mills, etc.

Also manufactured as STUD DRIVERS, NUT SETTERS AND TRANS-

Write for complete descriptive Bulletin No. 1007 today!



Machine Tool Type Utility Model

BUFFALO MACHINERY CO., INC. 838 Grant Street Buffalo 13, New York



SPRING Power and precess Foot Operated...

TAYLOR & FENN Spring Presses are used for Riveting, Staking, Stamping and similar operations on small, light parts. They are constructed to compensate for variation in thickness of the work and to deliver repeatedly a UNIFORM BLOW.

M-110 (illustrated) powered by a small reducer with a one-sixth H. P. motor, is designed to eliminate the fatigue factor inherent in foot operated Presses. A similar Press, M-120, of the same size and capacity is equipped to operate by compressed air.

OTHER MACHINES MANUFACTURED:

Vertical Millers

Duplex Spline Millers

Medium Duty and High Speed Sensitive Drilling Machines

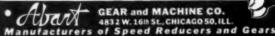
THE TAYLOR & FENN CO.
HARTFORD, CONN. U. S. A.

GEAR OUALITY

Precision-cut gears dependable for precision applications.
These are among industry's "musts" fulfilled by Abart. are among industry's

GEARS to Your Specifications

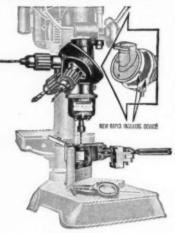
All gear materials. Send B/P or specifications for quotation, any quantity. No stocks carried. PROMPT DELIVERY. ABART SPEED REDUCERS: Ask for Catalog.





tools. Copies of the catalog will be sent free on request.

QUADRILL INDEXING FEATURE



A major improvement has been announced recently in the method of in-dexing with the Quadrill. According to the manufacturer, the new indexing device provides a fool-proof arrangement that will permit even the most inexperienced operator to speed up indexing and avoid error. It is further said by the manufacturer, that the new indexing device is built to the same high precision standards as the Quadrill itself, and that it has a unique, positive, quick-locking action that will greatly simplify indexing in all drill press operations.

This new indexing feature does not alter in any way the other Quadrill fea-tures such as, the four spindles and tapping attachment that permit a variety of operations on a single drill press without moving the work from press to press.

Complete details are available from Chicago Drillet Corp., 920 S. Michigan Ave., Chicago 5, Ill.

COOPER PARTS WASHER

The D. C. Cooper Co., 20 East 18th St., Chicago 16, Ill., announces development of a new metal parts washer for large or small plants. Washer is equipped with special spray hose, electric motor, spray pump and sturdy basket for handling



GEARS IMMEDIATE DELIVERY

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on gears of any kind. Send us your blue prints and inquiries.

Write for Catalog No. 70

HICAGO GEAR WORKS,

440-50 N. OAKLEY BLVD., CHICAGO 12, ILLINOIS

12" STROKE
20 TON CAPACITY
VERSATILE
PORTABLE

The Northern 20 Ton motor driven Hydraulic Press is a self-contained, completely portable unit. Pressure selection from 1 to 20 tons easily made by a turn of the Pressure Regulator screw. Massive arch design eliminates side thrust, dis-

tortion or cramping action. Fast (90" per min.) power stroke automatically changes to slow speed under load. Retracting stroke is 120" per

min. to reduce idle period to minimum. Northern Presses accommodate large die sets and easily handle work up to maximum capacity. Opening in frame is 14"x24". Alloy steel platen (16"x18"x 2") is ground, drilled and tapped on both sides to handle varied set-ups. Absolute rigidity, exact alignment and pressure control of Northern Presses make precision broaching one of many jobs they are handling in shops and tool rooms today.

Write for descriptive Circular



NORTHERN TOOL AND MACHINE CO. P.O. Box 68

BETTER with BEVERLY Throatless SHEARS



The No. B-3 BEVERLY Bench Type Shear with Ball Bearing Hold Down handles 3/16" or No. 10 gauge stainless steel. This sturdy shear weighs 58 lbs. and is equipped with H. C. H. C. Blades for heavy duty service.

Let us send Bulletins giving full details on the BEVERLY LINE -

THE BEVERLY SHEAR MFG. CO., 3005 W. 110th Pl., Chicago 43, III.



HIGH SPEED PRECISION DRILL PRESS

EASY, FAST OPERATION-REDUCTION OF DRILL BREAKAGE

Vibration-free variable speed, governor controlled, ball bearing motor (AC-DC) maintains maximum spindle torque from 1000 to 15000 RPM. Selective fine or coarse quill drive assures sensitive, easy and fast drilling for drills .004" to 5/32" with over 200% increased drill life. Max. chuck run-out .0001", 8 models adaptable to single or multiple head set-ups.

COMBINES ACCURACY WITH ECONOMIC PRODUCTION SEE YOUR DEALER OR WRITE FOR CATALOGUE

THE ELECTRO-MECHANO

261 E. Erie St.,

Milwaukee 2. Wis.

small parts. Special gauge tells at a glance amount of solvent in tank. Only one cleaning operation is required for all types of metals including aluminum, pewter, white metal, steel and iron.

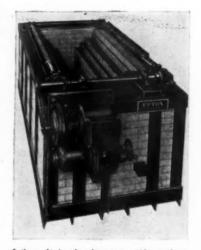
HIGH SPEED SALT BATH

A high production speed salt bath furnace designed for production quenching and especially suited for austempering high carbon and other steels is added to its line of electric salt bath furnaces by Upton Electric Furnace Division, 7437 Melville Ave., Detroit 17, Mich.

The new quench furnace is designed for a capacity of 1,000 pounds of work per hour at 700°F. The rapidity of quenching which permits this high speed operation is due, it is claimed, to two factors:-the step-back design and the method of adding balancing heat.

The exclusive step-back construction gives sufficient surface area to radiate and thus dissipate heat at a rate in excess of that brought into the furnace by heated work that is to be quenched.

Electrodes at bottom of the furnace supply exactly the right amount of heat to balance and thereby keep temperature



of the salt in the furnace uniform thruout. Since electrodes are at bottom of the furnace and thus the added heat put in



PORTELVATOR ELEVATING TABLE

A welcome helper in plants where man-power must be conserved to keep costs down.
PORTELVATOR carries work to and fro; acts
as work bench; can be used to support or
level large overhanging work . . . and hundreds of other uses

HAMILTON TOOL CO. HAMILTON, OHIO

A SAFE, Economical Helper

> Write for bulletin Dept. 14

Walsh PUNCH PRESSES

For 38 years soundly engineered Walsh Punch Presses have been yielding maximum profits. Thousands in use. Check these features:

Stability-heavy duty semi-steel frames.

Inclinability-positively locks in any position.

Crankshafts—forged alloy steel, normalized and ground.

Slide and Gibs—scraped to .002 alignments between press bolster plate and slide-bottom surface. Slide has solid surface for accurate alignment of die shoe. Die shank is clamped into slide by means of circular clamping.

Salety Locks on crankshafts prevent operation while changing dies.

Drive—multiple V-belt: can be adjusted while press
is running. Motor has overload

relay.

Write for full information.



Offices in Buffalo, Elmira, Rochester, Syracuse, New York City, Milwaukee, Detroit, Minneapolis, Cleveland, Indianapolis, Greenwich, Conn., and Houston, Texas.

LSH PRESS & DIE CO.

Division of American Machine & Gage Co. Plant 4721 W. Kinsie St., Chicago 44, Ill. Phone: Estebrook 6700



We'll solve that tricky problem.

We'll make tools that will cut your manufacturing costs to the bone; and if you want to get rid of all your headaches we'll make the parts for you too!

DROP US A LINE TODAY . . .

(or send your prints for quotation). We'll be glad to discuss your own particular problem with you if it involves tool or product design — or tool, machine or product manufacture. Consultation places you under no obligation

FLORIAN MANUFACTURING CO. . PLANTSVILLE, . CONNECTICUT

"Adjust-angle" Knurl Holder

Uses only straight knurls to make many patterns.







On work up to $2\frac{1}{2}$ " dia, this Holder produces various patterns from straight knurls by adjusting the angle. Shank to fit your turret.

Request Illustrated Price Circular

GRAHAM MFG. CO.

52 Bridge St., East Greenwich, R. I.



Equip with Grand Speed and see the difference! EXTRA - DEEP - THROAT CLAMPS a Grand Specialty. Alloy-Steel. S P A T T E R-PROOFED with copper plating. Other clamps of alloy-steel and malleable iron, for heavy of light duty.





Send for Complete Grand Catalog

Shows full line Grand Clamps and Vises with new features for speed, easy operation and dependability. Write

GRAND SPECIALTIES CO. 3137 W. Grand Avenue, Chicago 22, Ill. at the bottom by heating the salt at the bottom, circulation of heated salt is natural and normal and insures uniformity of temperature to produce uniformly treated work. Moreover, it is claimed that with this design and its accompanying temperature control, temperatures are held to plus or minus 5°F, with selection of various operating temperatures easily varied to suit different kinds of work.

A variation in the speed with which work progresses thru the furnace is also available by adjustment of the variable speed transmission which drives the two worms that carry the work thru the

bath.

When used with Upton pre-heat and high heat furnaces of similar design, this design permits full automatic heat treating. In addition to full automatic operation, including temperature control and timing, the salt that coats the work provides protection against oxidation during the short interval work is being transferred from high heat to quench.

JESSOP STAINLESS STEELS

Jessop Steel Co., Washington, Pa., has issued an 8-page circular describing its stainless steels. These steels include a large number of different alloy compositions, each of which is designed to provide certain specific properties, such as greater corrosion resistance, stability at high temperatures, resistance to scaling, improved machineability, etc. In addition to their corrosion and heat-resisting properties, other important advantages are high tensile strength, attractive appearance and ease of cleaning. Jessop Steel Co. is one of the pioneer producers of stainless steel.

The data in the circular show the range of chromium content in Jessop Stainless Steels, the physical properties and mechanical characteristics, the corrosion-resistance, and properties in fabrication, all arranged in tabular form. One page is devoted to Jessop Stainless-Clad Steel, a composite metal consisting of a layer of corrosion-resistant electric furnace steel, which is diffusion-welded to a mild

steel backing.

STITES CAM AND TOOL CIRCULAR

Stites Cams and Tools for screw machine products are described in a new 4-page, illustrated circular. Examples of the products are pictured, and there are illustrations of the firm's laboratory facilities, in which rigid inspection of its products is conducted. Stites manufactures circular form tools for all Brown & Sharpe Automatics.



ANY TYPE - Spur, helical, herringbone, bevel, worm, spiral

ANY SIZE-14" to 60"

ANY MATERIAL - Cast iron, steel, brass, bronze, Micarta

ANY QUANTITY-One gear or volume production

We are equipped for prompt service on SPECIAL GEARS AND BREAKDOWN JOBS. Send us blueprints or gear samples. Write for our complete 111 page stock gear catalog, including chains, sprockets and reducers.

ATLANTIC GEAR WORKS

SPRING TESTING:

The Solution of Many a Baffling Problem

When the performance of products with a spring mechanism varies, experience has proved that the most likely source of the trouble is the spring. It may be that certain springs are out-of-square, or have inaccuracies in the coils, or have hidden flaws in the wire, or be too weak or too strong for their intended purpose. Check the springs FIRST! You'll find it will save you many tedious hours of hit-and-miss trouble shooting.

LINK Spring Testers

For speedy and accurate testing of springs—compression, tension or torsion—get a LINK Spring Tester. Hand operated instruments for spot-check, laboratory, and inspection. Also motor-driven instruments for production testing. Moderately priced. Send for complete information.



Write for Circular 107 LINK ENGINEERING DETROIT 27, MICH. 13843 ELMIRA

Carbide Bearings for Heavy Duty Grinding

Installation of sleeve-type bearings made of solid cemented carbide running against solid cemented carbide, in place of the standard ball bearings, on Dumore "toolpost" grinders made it possible for Carboloy Co., Inc., Detroit, Mich., to use these grinders under what would have been heavy overloads for the steel bearings. Under these conditions, the Carboloy bearings are reported to have eliminated virtually all maintenance, also increasing bearing life more than 50 times.

The grinders are used at Carboloy for production grinding of internal and external surfaces of carbide die nibs. Diamond wheels are used for these grinding operations and the necessary wheel pressure is about 10 times that used with ordinary abrasive wheels. This resulted in considerable overload on the stand-

ard ball bearings.
Under such conditions, the overloaded steel bearings ran accurately for about a week and then showed signs of wear. The shafts developed small amounts of play which rapidly grew worse until the machines had to be shut down and new

ball bearings installed.

To overcome this, a set of Carboloy cemented carbide combination thrust and radial load sleeve bearings with conical bearing surfaces was installed at each end of the shaft. The inner half of the bearing—of Grade 44A Carboloy which is widely used for drill jig bushings, lathe centers, etc.,—is attached to the shaft with Woodruff keys. The surfaces of these inner bearing members are grooved for lubrication.

The stationary outer bearing members are of Grade 78B Carboloy, which is particularly tough as well as wear resistant. The conical bearing surfaces take the



bearing load, while cylindrical portions of the bearings may have a running clearance of from 0.0005" to 0.0008". Bearing surfaces are lubricated with a mixture of kerosene and colloidal graphite. Lubricant is applied by putting a few drops of the mixture into a small cup which permits lubricant to reach bearings thru wicks.

The carbide-to-carbide bearings when subjected to the same service as the conventional hardened steel ball bearings—continuous operation thruout two eighthour shifts per day—have been in operation for more than two years. About 0.000004" of wear has occurred in that time. Thus, it is estimated that the carbide sleeve bearings will outlast the hardened steel ball bearings more than 50 to 1 under such conditions.

MARKING DEVICES

The latest catalog of Hoggson & Pettis Mfg. Co., New Haven, Conn., contains a thumb-indexed listing of five major lines, well illustrated.

Marking devices occupy 12 pages; rubber tools, 4; rubber molds, 6; laboratory equipment, 2, and ticket punches, 4. Marking equipment includes hand stamps and stamps for machine or jig operation, embossing and coining dies, pantograph engraving and engraved steel rolls for rubber.

In molds and dies for rubber and plastics, the firm's products represent nearly 90 years' experience, it is indicated,



The Conner Deep Hole Drill is claimed to embrace the advanced features of the conventional deep hole drill. Coolant enters around the outside of the drill, flushing the chips back thru hollow center of the shank. Other features include—

1.—Interchangeable high-speed drill tips. (a) Tips cost only a fraction of a complete high-speed drill. (b) Head does not have to be removed from the shank to sharpen drill. (c) Cutting edge and chip breakers of spare tips are easily reground while head remains in service.

2.—Hard Stellite wear strips present



and speed in hobbing PINIONS, GEARS and SEC-TORS

TWO MODELS

No. 00 SPUR GEAR HOBBER (Illustrated) for work up to 2" dia. No. 1 SPUR and SPIRAL GEAR HOBBER for work up to 6" dia.



Write for further details Dept. 14

HAMILTON TOOL CO.

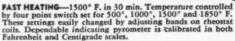
TEMCO.

HANDY PORTABLE FAST HEATING

UNIFORM TEMPERATURE

ELECTRIC FURNACE





UNIFORM TEMPERATURE—Heating element of highest quality nickel-chromium alloy forms a continuous coil and is embedded in sides, top and bottom of muffle chamber. This construction assures uniform temperature and protects element from damage and oxidation, Complete muffle unit is replaceable.

PORTABLE—Body is aluminum, Total weight, 17 lbs. Muffle chamber, 4" x 3\\\ 3'\ x" x 3\\\ 4"; furnace overall, 9\\\\ 4" x 13\\\\ 2" x 10\\\\ 2". Supplied with attachment cord. Operates on A.C. and D.C., 115 of 230 V. (be sure to specify voltage). Max. power consumption 1200 watts.

Larger models available See your supply house or write,

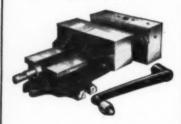
THERMO ELECTRIC MFG. CO., 486 W. Locust St., Dubuque, Ia.



GRAHAM MULTI-PURPOSE VISE



Use it plain or as a Jig or repeat Fixture



In conversion days, this vise is just the thing to save making a lot of jigs and fixtures that would become obsolete as changes were made. Grinders, stops, bushings, and special jaws to hold all manner of irregular shapes. Made in sizes up to 124 lbs. for shaper, planer, drill press, radial, miller, grinder. Flush, parallel, square construction promotes accurate positioning.

Request Illustrated Price Circular

GRAHAM MFG. CO.

52 Bridge St., East Greenwich, R. I.

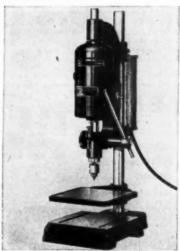
six radial points of support at cutting edge. These offer unusual resistance to abrasion and may be reconditioned at such time as wear would make a regular drill valueless.

3.—Heat treated alloy steel body. As only high-speed drill tips and the wear strips are hard, breakage at the head is practically eliminated.

Further details are available from Conner Tool & Cutter Co., 5555 Conner Ave., Detroit 13, Mich.

ELECTRO-MECHANO DRILL

Several refinements and advances have been made in the Electro-Mechano High Speed Precision Drill Press, which is designed for speedy, economical small hole drilling. The spindle is integral with motor rotor which makes for smooth, vibrationless operation.



The broad speed range—1000 to 15,000 rpm is instantly set by motor governor control.

A direct feed is provided for the larger drills and a micro-feed for small drills.

The governor control is distinct from conventional rheostat control which will vary in speed with load changes. The Electro-Mechano control is designed to maintain exact, desired drill speed, load or no load. Spindle speed is set by the simple movement of a lever located on front of machine. Lever moves over a scale graduated in actual drill rpm, permitting rapid adjustment of spindle speed.

The standard feed is intended for use with \%" to No. 60 drills. The micro-feed provides a slow, sensitive feed for drills

down to .004".

The wide-spaced quill bushings and small precision type bearings are said to eliminate side play. Table is ground on both sides to facilitate clamping. The depth stop, mounted close to quill has positive action and is easily adjusted.

Model 101 is recommended for drill sizes .004" to .125"—Model 102 for drills .010 to

.125".

A 6-page bulletin giving full details is available from The Electro-Mechano Co., 261 E. Erie St., Milwaukee 2, Wis.

FLEXIBLE COUPLINGS

A new bulletin FC-121A describes the different types of Flexoid Industrial Couplings offered by The Smith Power Transmission Co., 1545 E. 23rd St., Cleveland 14, Ohio.



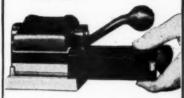
Resinoid and metal bonded wheels for SURFACE GRINDING FORM GRINDING HONES for HAND HONING

Send for Diamond Wheel Price List No. 45



MANUFACTURERS' AGENTS WANTED

For the



Bakewell Toolholder

Shop and toolroom men instantly recognize its desirability. Designed and built originally for our own production and toolroom use on urgent war contracts, the Bakewell Toolholder effected up to 35% faster production—up to 60.2% savings in lathe scrap—requires about 1/12 the previous time to machine special bars. Easily installed by user without machining. Easy to sell. No service required.

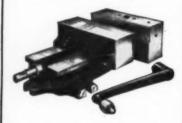
Now offered commercially for the first time. Write today for details.

Bakewell
Products Company
2427 East 14th Street
1as Angeles 21 California

GRAHAM MULTI-PURPOSE VISE



Use it plain or as a Jig or repeat Fixture



In conversion days, this vise is just the thing to save making a lot of jigs and fixtures that would become obsolete as changes were made. Grinders, stops, bushings, and special jaws to hold all manner of irregular shapes. Made in sizes up to 124 lbs. for shaper, planer, drill press, radial, miller, grinder. Flush, parallel, square construction promotes accurate positioning.

Request Illustrated Price Circular

GRAHAM MFG. CO.

52 Bridge St., East Greenwich, R. I.

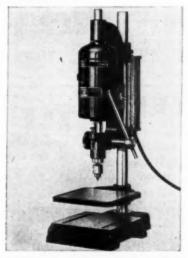
six radial points of support at cutting edge. These offer unusual resistance to abrasion and may be reconditioned at such time as wear would make a regular drill valueless.

3.—Heat treated alloy steel body. As only high-speed drill tips and the wear strips are hard, breakage at the head is practically eliminated.

Further details are available from Conner Tool & Cutter Co., 5555 Conner Ave., Detroit 13, Mich.

ELECTRO-MECHANO DRILL

Several refinements and advances have been made in the Electro-Mechano High Speed Precision Drill Press, which is designed for speedy, economical small hole drilling. The spindle is integral with motor rotor which makes for smooth, vibrationless operation.



The broad speed range—1000 to 15,000 rpm is instantly set by motor governor control.

A direct feed is provided for the larger drills and a micro-feed for small drills.

The governor control is distinct from conventional rheostat control which will vary in speed with load changes. The Electro-Mechano control is designed to maintain exact, desired drill speed, load or no load. Spindle speed is set by the simple movement of a lever located on front of machine. Lever moves over a scale graduated in actual drill rpm, permitting rapid adjustment of spindle speed.

The standard feed is intended for use with \%" to No. 60 drills. The micro-feed provides a slow, sensitive feed for drills

down to .004".

The wide-spaced quill bushings and small precision type bearings are said to eliminate side play. Table is ground on both sides to facilitate clamping. The depth stop, mounted close to quill has positive action and is easily adjusted.

Model 101 is recommended for drill sizes .004" to .125"—Model 102 for drills .010 to

.125".

A 6-page bulletin giving full details is available from The Electro-Mechano Co., 261 E. Erie St., Milwaukee 2, Wis.

FLEXIBLE COUPLINGS

A new bulletin FC-121A describes the different types of Flexoid Industrial Couplings offered by The Smith Power Transmission Co., 1545 E. 23rd St., Cleveland 14, Ohio.



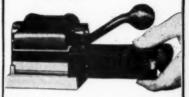
Resinoid and metal bonded wheels for SURFACE GRINDING
FORM GRINDING
HONES for HAND HONING

Send for Diamond Wheel Price List No. 49



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Bakewell Toolholder

Shop and toolroom men instantly recognize its desirability. Designed and built originally for our own production and toolroom use on urgent war contracts, the Bakewell Toolholder effected up to 35% faster production—up to 60.2% savings in lathe scrap—requires about 1/12 the previous time to machine special bars. Easily installed by user without machining. Easy to sell. No service required.

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Products Company
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DOZENS OF APPLICATIONS
—use it for faster, smoother
work on steel, non-ferrous
metals, plastics, wood, glass
and other materials.



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• Up went volume so down goes price. This is exactly the same high-powered, high-speed PRECISE 35 that broke war-time production records. Designed for industry, engineers marvel at its precision—at its tremendous power and sustained higher speeds under load. Outworks anything in the field—that's why PRECISE 35 is standard equipment for the U. S. Navy. Cased

in durable, lightweight plastic; guaranteed ahockproof on AC or DC without ground wire. Mounts in stand, vise, lathe, or milling machine; for close jobs attach COOLFLEX Flexible Shaft. Every plant and maintenance department, every shop, and plane needs PRECISE 35 with complete accessories.



PRECISE PRODUCTS CO. 1331 CLARK STREET RACINE, WISCONSIN

PRECISE 35

SILICONE RUBBER

Dow Corning Corp., Midland, Mich., announces the commercial availability of Silastic, a silicone rubber, produced in various stocks for molding, extruding, coating and laminating. Largely because of their inorganic origins, these rubbery organo-silicon oxide polymers remain elastic after heating at temperatures up to 500°F and retain flexibility at temperatures as low as —70°F.

Silastic stocks are available for molding flat sheets, gaskets and other shapes. Silastic-coated lead wire and other continuous extruded shapes are made from Silastic stocks designed for extruding. Silastic stocks are also compounded for coating glass or asbestos cloth to produce flexible, waterproof, heat stable, oil-resistant gaskets, diaphragms, tape and electrical insulation which is nontracking, are and oxidation-resistant.

Laminates may be made by curing under pressure multiple layers of Silasticcoated inorganic fabrics.

Silastic coatings adhere to glass, vitreous enamel, iron, steel and aluminum. They constitute protective coatings which are resistant to oil and salt brines at elevated temperatures.

Silastic stocks now available have exceptional temperature stability, tensile strength of from 200 to 330 pounds psi, elongation ranging from 70 to 115%, high re-

sistance to water, brine and oil, and excellent electrical properties of the following magnitude:

Dielectric constant at 1,000,000 cycles of 5.0 to 7.5; power factor at 1,000,000 cycles of 0.13 to 0.18%; and dielectric strength of 500 volts per mil. The properties of Silastic stocks, notably their tensile strengths, are being steadily improved. For most recent data sheets and suggested methods of fabrication address inquiries to O. D. Blessing, Sales Manager, Dow Corning Corporation, Midland, Mich.

USE

Fluid-Motion for Modern form-dressing

ONE

SETTING HANDLE CONTINUOUS MOTION

J & S Radii & Angle Dressers in the "Fluid-Motion" series are among the finest precision dressing instruments procurable . . . regardless of cost. There is a standard model to fit most form-dressing requirements.

Features

Fluid-motion dressing ,0001" accuracy Automatic centering 7" & 14" wheel capacities Large range yet compact Chatterless and dustproof

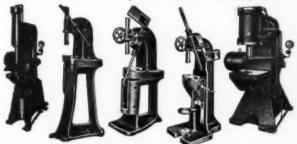
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J. & S. TOOL CO.

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PRECISION WORK IN MANUFACTURING

65 Standard Styles and Sizes. Manually operated presses $\frac{1}{4}$ to 35 tons pressure. Motor driven hydraulic presses $\frac{1}{2}$ to 30 tons pressure.

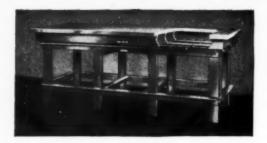
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NEW HAMPSHIRE



Clamp Anywhere—on CHALLENGE CLAMP-EDGE LAYOUT PLATES

● Speed up layout and assembly operations with these "all-clear" clamp edge layout plates—just put the clamps anywhere and go ahead—no ribs to interfere with your set-up.

These Challenge Layout Plates are built of finegrained, special analysis semi-steel castings.

Furnished in five standard sizes from 36x72 inches to 54x144 inches—complete with strong, rigidly braced, arc-welded, all steel stand fitted with lock-leveling screws to permit accurate leveling. Write for complete information and prices.

* * BUY MORE VICTORY BONDS * *

THE CHALLENGE MACHINERY CO.

"Over 50 Years of Precision Equipment Manufacture" MAIN DEFICE AND FACTORY: GRAND HAVEN, MICH.

ULTRA VIOLET LIGHT INJURY

Experiments with baby chicks reveal that exposure of eyes to invisible ultraviolet light ranging from 300 to 365 millimicrons in wave length—a range previously considered harmless by some authorities—delays dark adaptation and impairs visual functions even when the eyes themselves show no obvious injury. The eye research, conducted by Dr. Ernst Wolf, of the Harvard Biological Laboratories, was sponsored by American Optical Company, Southbridge, Massachusetts.

As human eves could not be utilized in view of the potential danger, Dr. Wolf selected baby chicks for testing, because the visual characteristics of their eyes approximate closely those of a human, and also because chicks obligingly keep their eyes wide open during exposure to ultraviolet.

After a year's study of the effects, he discovered that the ultraviolet light in question definitely impaired the functioning of the chicks' visual mechanism even though under some conditions no obvious pathological changes the eyes could be observed.

He therefore concludes that protective lenses excluding the dangerous rays should be worn by welders and their helpers, skiers, fliers, sun bathers and other persons exposed to the radiations.

In explaining his investigations, Dr. Wolf points out that light rays can be accurately measured. Visible light rays range in length from about 400 to 750 millimicrons (a millimicron is 1/25,400,000 of an inch). The invisible ultraviolet region starts below 400 millimicrons and includes all shorter waves until air absorbs them around 190 millimicrons.

The welding arc emits ultraviolet ranging from 190 millimicrons to the visible region. At the beach the rays extend from about 290 millimicrons up to the visible, depending on atmospheric conditions.

HART'S Machine Vise Jaws



These Jaws are useful on any machine table. The angle holding the work down. Suitable to clamp or bolt to table. The hardened tool steel jaw measures $3"\times6"~1/2"$ thick angle edge serrated.

HART'S Milling Fixtures



These fixtures will make themselves popular and profitable in your shop. Easily kept clean to receive the work. May be used in either horizontal or vertical position. Suitable to hold round, hexagonal, octagonal, or square stock, aligning the work with the machine. Grip holds the work on the bottom as well as on the back. Shipped in pairs, unless otherwise ordered. Made in 4 sizes—to hold stock from ½ to 5 inches.

HART MACHINE CO. 26 MATHER ST., DORCHESTER, BOSTON, MASS.

When writing for descriptive circular kindly mention the BLUE BOOK.

ALMOND. Triple Jaw CHUCK

The Almond Three-Jaw Drill Chucks were pioneers in the field of drill chucks. Since 1872 they have played a necessary part in the logical procedure of machine developments.

Almond Chucks are furnished in nine sizes with capacities from 3/16 to 1°. They are made for heavy and light duty types with taper or threaded arbor hole—to fit all machine tools and portable tools.



Write for complete details.

The Original

Manufacturers

of Drill Chucks

T. R. ALMOND CO.

ASHBURNHAM.

MASS., U.S.A.



There are hy-draulic surfacegrinding machines, in fairly wide use, designed for surfacing dies without removing the guide posts or leader pins. Where such machines are in use, dies are usually kept in better condition, because the regrinding operation is so much easier and economical. and can therefore be performed more often. New dies can also be surfaced quickly with this grinder, which can be provided with automatic hydraulic crossfeeds. if desired.

Small dies having circular recesses are often a lathe grinding job. One simply holds the die in a chuck in the headstock. using a tool-post grinder for the grinding. One toolpost grinder was recently noted on a lathe, engaged in grinding a heading die for clinch-on nuts. External circular grinding, of course, is per formed in a similar manner.

GRINDING OPERATIONS ON DIES

Among the many important grinding operations on dies, a number are naturally performed on surface grinders. Some surface grinders used for this purpose are inexpensive, and for that reason practically any shop can afford to have at least one. Other shops find it saves valuable time to have a number of these machines, placed where the men can reach them quickly, making it unnecessary for one toolmaker to wait for another to finish a job. Hand-feed surface grinders commonly grind dies to close tolerances.

A number are using a modern machine known as a jig grinder. Here is a machine tool especially designed for finish-grinding holes to both size and location, to meet the increased accuracy demanded in dies for sheet metal stampings, etc. With a machine of this kind, the hole in a die may be made undersize preliminary to hardening, and then re-located and finish-ground afterward. It has been estimated that die life in different instances has been lengthened from 25 to 100 per cent where this grinding procedure has been followed.

"ROCKWELL"



Shipment from stock of these Enormously Improved New Models.

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Concord Ave. WILSON
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An Associate Company of American Chain & Cable

The CRITERION Carbide Tool Grinder

GREATER PRODUCTION CAPACITY

Provides positive rapid adjustment to meet the rigid requirements of production tool manufacturing. But for continuous service. Adjustable ecolorit system Large work tables instantly adjustable without wrenches or other books. One-third H.P. balanced recision bearing motor completely enclosed and radially mounted in rubber. Standard equipment: One 60 and one 100 gnt 17 dis. steel backed silicon carbide wheels Ideal for metal banded or Resinoid bonded diamond wheels.



Order from your dealer or write direct. Request literature. No obligation.

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ASPECTS OF HEAT TREATING

Many small parts, as for instance nuts, screws, bolts or needle bearings, can be and are heat treated by a continuous process. In this connection, an open-mesh type of quench tank belt is used, which carries the parts up out of the quenching liquid and allows them to drain quite thoroly en route. Belts of this kind are provided by some of the leading wire cloth manufacturers. Their mesh size, as well as their gauge, is determined by the size and weight of parts being heat treated.

The production of projectiles and various other items, during the recent

war effort, resulted in some highlydeveloped heattreating layouts.
It is likely that the
ideas incorporated
into them will be
carried over into
the heat-treating
of numerous
peacetime products as well.

An interesting case in point is a continuous furnace and quenching tank layout, used for heat treating armor - piercing shot. These shot are p-laced with their points up-ward, in a special conveyor, which carries them into ber of a hardening furnace. It takes them almost an hour and a half to pass thru this heating chamber. where they are brought up to a temperature of 1530°F

As the hot shot emerge, they are picked up with tongs, turned over and placed pointed end down in special holders in the quench is in oil, which is held be-

quench is in oil, which is held bewhich is held between the limits of 110 and 150°F. After
spending about 15 minutes in the quenching tank, they pass on into a drawing
furnace. Here, they remain for about six
hours, at a temperature of 400°F and then
the treated pieces are removed and
placed in storage.

Carburized parts are popular with many, especially when parts must be made as fatigue resistant as possible by heat treating. The average depth of carburized layer is probably around .035" or .040". In some places, special systems have been installed, for reconditioning and conveying of the carburizing compounds used.



Punches and dies are

carried in stock in a large range of round. square, flat, and oval

Catalog No. 8 available

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CARL ZEISS INC. HEADBAND MAGNIFIER 21/4x

Use of both eyes reveals true depth of details. Magnification of 21/4x. Free working distance,

about 8", permitting unhindered use of hands. By just lifting your head, your eyes are free for any other activity. Eyeglasses may be worn while using. Highest optical quality. Eyeshade of Tenite—practically unbreakable.

Also Aplanatic **Folding Pocket** Magnifiers 6 and 9 power



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"FORM-GRINDING" - - - is our business!



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(MAKERS OF J. & S. "FLUID-MOTION" FORM-DRESSERS) & S TOOL CO. 477 MAIN ST. - E. ORANGE 2, N. J.



types . . . in several sizes. Will double output of any single

Quickly adjusted to desired drill centers from 1/6" to 6".

Send for bulletin.

LINDERME MACHINE & TOOL CO., INC. 12253 Covle Ave., Detroit 27, Mich.

COSTS IN RECONVERSION

A company's success is dependent upon its ability to produce at the lowest cost and with the highest quality and service, it has been pointed out by Henry V. Oberg, Industrial Engineer of the Armstrong Cork Co., Lancaster, Pa., in urging supervisors in industry to give all-out attention to cost control during the reconversion period.

In "Every Supervisor A Cost Manager," a special issue of the weekly "Manage-ment Information" Bulletin published by Elliott Service Co., New York, Mr. Oberg cites the fact that every item of cost has

its effect on the total cost of goods produced. Therefore, he says, every supervisory executive, to truly manage his de-partment, must manage the costs under his con-trol. To best accomplish cost control the supervisor must understand the company's cost system and start to tighten whatever controls were relaxed during the war-time need for maximum production.

The management of costs, Mr. Oberg says, covers two functions: 1. The control of current costs, and 2. the continued endeavor to reduce these costs by improvements in work methods.

The types of costs Mr. Oberg asserts a supervisor can control are: The cost of labor used in ac-tually turning out the product or service and in servicing the

producing operations; the cost of material usage and the scrap and waste incurred; the cost of maintaining the equipment and tools; the cost of supervision and clerical effort; the cost of various supplies used by the department, and the cost of heat, power, light, gas, water and air supplied in order to carry on the operations.

Copies of this special issue will be sent free to industrial executives who request a sample copy on their letterheads addressed to the publisher, Elliott Service Co., 219 East 44th St., Department C-86, New York 17, N. Y.

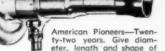
ILLUMINATED INSPECTION



"Lenox Detects Hidden Defects" while exploring the dark holes of industry - guns. hollow shafts - Refinery, well drill and other tubing, irregular dark spaces.

LENOX INSTRUMENT COMPANY

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The lowestpriced wire and rod cutter on the market. The hardened cutters last indefinitely.

Hand operated. A giant for work, cuts wire and rods up to %-in. round or %-in. square and band iron up to in. by 2-in. Adjustable stop for repeated cuts to same length. Large or small, your shop can use a WONDER CUTTER.

> Write today for prices and trial offer.

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Labor and Time

Eliminate heavy lifting. Cut handling Table

swivels and locks in any position. Can be varied 151/2 by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

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BENCH CENTERS



Removable Centers are tool steel, hardened and ground. Equipped with spring-type tail stock. Made in 6 inches diameter, 18 inches between

MICHIGAN DRILL HEAD CO.

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For Polishing, De-burring, Filing, and General Finishing Operations on Small Metal and Plastic Parts.

Here is a small, light-duty Speed Lathe · Compact · Complete · Ready to Operate · With All the high-quality construction of the famous larger Ideal Speed Lathes, Plus New and Exclusive Time and Labor Saving Features.

New engineering refinements and improvements provide new ease of operation, greater convenience of operation, and choice of operating sequence through simple, accessible adjustments.

FOR COMPLETE DESCRIPTION WRITE FOR CIRCULAR 453



BELT SANDERS AND GRINDERS

The contribution made to smoothing, polishing, burring and chamfering metal and metal parts by abrasive-belt machines of different kinds is large. If there are sizable flat areas to be finished, as on sheets or plates, a sander of the handblock type is used. Some firms supply such machines to both the woodworking and metal-working industries, but when they are supplied for metal finishing, the speed of the belt is made slower. One company provides such machines for metal finishing, in which the belt is given a surface

speed of 1,800 feet per minute for a v e r a ge work. However, special speeds are availa ble on such belts, for special work.

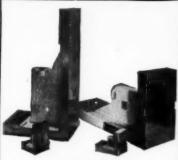
Small sanding or grinding belts are much used for cleaning and finishing castings or stampings, for doing polishing, grinding, burring or chamfering on small parts. One small machine of this kind is horizontal and is fitted with a supporting platen, over which the belt runs. It is placed on any convenient bench for use.

Another machine, used for similar work, has the belt running vertically, but it has a vertical support behind the belt and a table to support the workpieces. This machine is used in bench models in some places, and in floor types in other shops. Possibly the type of machine on which the abra-

sive belt is mounted in such manner that it can be quickly converted from a horizontal to a vertical belt, or vice versa, is the most popular.

An interesting departure in belt grinder design is found in a machine which has two abrasive belts, each running on two pulleys, all four pulleys being mounted in such manner that their centers are in the same straight line. The two pulleys nearest to one another are rubber-covered. The arrangement is such that material of flat strip type can be ground on either one or both sides, in one operation.





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UNIVERSAL ANGLE PLATES, BORING MILL ANGLES, SURFACE AND LAPPING PLATES AND PARALLELS.

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Bench or Pedestal Type MODERATELY PRICED

CATSKILL METAL WORKS, Inc.

CATSKILL, NEW YORK



SCHRILLO TOOLS solved many a complex war production problem—provided quality so deeply inbuilt that even continuous punishment in no way impaired their accuracy and efficiency. *These same tools, by the same workman, built to the same high Schrillo standard, can today solve many a complex reconversion problem. It's worth while talking it over with a Schrillo representative. *Schrillo Aero Tool Engineering Company, 8715 Melrose Avenue, Los Angeles 46, Calif.



HARDNESS VS WEAR RESISTANCE

Hardness and ability to resist wear are not necessarily related. This fact is important to remember when considering what type of dimensional control gage to buy, it is pointed out by Roger F. Waindle, manager of industrial sales for the Sapphire Products Division of the Elgin National Watch Co., Aurora, Ill.

"The significant factor is the nature of the substance used for the gaging member," he declared. "Elgin makes plug and ring gages of sapphire, which approaches the diamond in hardness. Other gage manufacturers use steel or the recently developed nonmetallic compounds of great hardness, such as the well known carbides.

"While many carbides are comparable to sapphire in hardness, few of them approach the sapphire in either toughness or wear - resistance. Specifically, records on a particular gaging operation show a sapphire ring gage giving 530,-000 close tolerance gagings without appreciable wear, while a cemented carbide gage wore beyond tolerance after 500 gag-

The reason for sapphire's great wear resistance—in this case, a thousand times greater than steel or cemented carbide—is not to be found in its greater hardness, Waindle pointed out, because the difference in hardness between the two

substances is not great.

"Rather, inherent unique properties of sapphire account for its greater wear resistance and better all-around serviceability. Sapphire is a fully stable substance, non-porous, a homogeneous noncrystal; with its high hardness it provides the rare combination of exceptional wear resistance and toughness. Cemented carbides, on the other hand, are a heterogeneous mass of minute, individually hard crystals which are separable, one from the other, under the severe stress of grinding wear.



PRUTTON Taxomaster





3 TAPPING MACHINES IN 1

Speedy; can do three jobs at once, tapping any size hole up to % Three separate motors. Single or continuous cycle. Positive feed by husky lead screw prevents tearing of threads. Safe—no jamming of work. Ample tanks for coolant oil—ready accessibility. Descriptive bulletin. 3/4" awning eye-end and 3/4" pipe cap; 1300 per hour on Tapmaster.

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Offset Type

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All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

THREE-FOURTHS OFFSET.

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SPECIFICATIONS:
Open Width %" to 6"
Gage Material .040 to .125 Pin Diameter .101 to % Lengths to 120°



HELPING REAL

It's a help that die makers, tool makers, machinery builders and general machinists have long soughta more accurate and surprisingly faster way of transferring blind screw holes.

The Heimann Transfer Screw Set is a self-contained, complete tool. No wrenches or pliers are necessary. Made in 3" to 1" diameters. Send for price list.

HEIMANN MFG. CO.

332 Lincoln Ave. Urbana, Ohio

Use artificial or natural gas or gasoline. Start without generating
—"soldering heat in less than a minute." Schmidt "CONCEALED FLAME" Soldering Torches hold coppers steadily at any desired heat for continuous work. Very economical.

A moderate investment in Schmidt Equipment will step up production, reduce costs and increase profits. Send for circular,

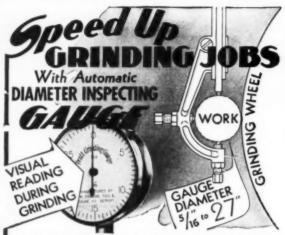
> MINN-KOTA FOUNDRY & MFG. CO. Dept. 804 Fargo, North Dakota

for all Soldering Open Flame Work Brazing Branding Laboratory Use, etc.

CONCEALED FLAME

TORCH

OPEN FLAME TORCH



Pratt Grinding Gauges caliper external cylindrical jobs while work is in motion or at rest. Adapted to straight or tapered work. Tolerances of .0001" plus or minus easily maintained. Visible check on out of roundness, rough grinding and chatter. Cannot grind work undersize unknowingly. Easily installed on any grinder. Pratt Grinding Gauges increase production, eliminate scrap and assure accuracy. A modern precision tool, ruggedly built.



BLOW GUNS FOR CLEANING

Compressed air has long been used for blowing dirt and foreign matter out of machinery and other equipment that would be difficult to clean in any other way. It is possible to use an ordinary air hose and nozzle for this purpose, simply turning a valve in the air line to start or shut off the flow of compressed air. Modern practice, however, leans heavily toward the use of some sort of blow gun at the end of the hose, in order that the air flow may be controlled by the operator, while the gun is in use. This saves a great deal of air, and consequently

economizes on air compressor capacity.

Manufacturers of spray painting equipment often provide an efficient gun of this kind, primarily meant for blowing and cleaning off surfaces and other parts of equipment prior to finishing. However, the guns are used for all cleaning purposes where air under pressure is the cleaning medium. In the foundry, great numbers of these little blow guns are in use daily for cleaning sand molds, core box-es, flasks and patterns, as well as for general dusting. In the machine shop, the same kind of gun is found indispensable for blowing away chips, borings, filings and turnings, as well as for cleaning benches, blowing out motors and cleaning shop equipment general. One manufacturer of

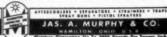
spray painting equipment has these guns in sizes varying from \(\frac{1}{4}'' \) to \(\frac{3}{4}'' \).

One blow gun recently noticed is equipped with a removable nozzle. The reason for making it removable is to make it interchangeable with long spouts, so that deep cavities and crevices can be readily reached and cleaned. It operates on individual or air-line compressors up to 250 pounds' pressure and has a solvent-resistant soft rubber valve disc, which stays tight when the trigger is released and prevents waste of air.

One valve manufacturer makes blow guns which regulate air from puff to blast.



Murphy knows compressed eir. Write for our literature, or state your problem. Our engineers are at your service.





Use TORNADO for Quicker Cleanups

POWERFUL suction from 1 h.p. G.E. motor makes quick work of cleanups of plant—floors, walls, overhead pipes, etc.

12-gal, tank. Portable anywhere. Plugs in at any electric outlet. Weighs only 40 lbs, Keeps plant clean for faster production.

Request details and FREE TRIAL

BREUER ELECTRIC MFG. CO.



ARMSTRONG - BRAY GEAR AND WHEEL PULLERS

PROMPT SHIPMENT ESSENTIAL TOOLS

Write for Catalog Sheets showing STEEL-GRIP Standard 2 and 3 arm Wheel Pullers, special Battery Terminal, Pitman Arm, Fan Pullers and CHAINGRIP Universal Pullers.

ARMSTRONG-BRAY & CO.

"The Belt Lacing People"
5324 Northwest Highway, Chicago 30, U.S.A.



Send for information of its many versatile uses General Sales Offices

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MULTIPLE

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Here you have only one receptacle to watch and keep filled—a time saver and an assurance of dependable lubrication. Gits "MD" Sight Gravity Feed Multiple Oiler is a simple, practical and economical means of lubricating from 3 to 12 individual points from a central reservoir. Large capacity, transparent unbreakable plastic reservoir provides clear vision of oil contents at all times. A shut-off valve is located at the top of the trans-

parent reservoir to prevent oil flow to the horizontal oil chamber when machines are not operating. Each drip fitting is equipped with an individual needle valve adjustment for regulating flow of oil, which can be locked against vibration. Ask for complete information on range of models and prices. Gits Catalog No. 60 illustrates and describes a full line of Oilers, Oil and Grease Seals and Lubricating Devices—write for your copy.

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BLACK LIGHT LAMP FOR RADIO

The Westinghouse Lamp Division, Bloomfield, N. J., has developed a fluorescent lamp producing unseen ultraviolet rays under whose magic touch the dial markings of home radio or television receivers are transformed into new, uniformly-glowing colors.

The invisible ultraviolet rays generated by the new lamp, explained Eugene W. Beggs, Westinghouse engineer, "activate the multi-colored fluorescent pigments on the dials, making them leap to life with new depth and beauty."

The tubular lamp itself is a simplified.

miniature version of the fluorescent tube used to light homes, offices, industries and public places. But in place of the phos-phors selected for the production of visible fluorescent light, special black light phosphors coat the inner surface of the radio panel lamp. It will be used with a special glass mask which blocks out stray visible light present even with black light phosphors, but nevertheless permits the invisible black light to stream thru.

Under average usage, the engineer said, the lamp should burn five years without replacement, adding that its life was unaffected by frequent turning on and off of the radio.

A trifle longer than a fountain pen—its luminous length is 7" and its overall length is 8½"—the lamp casts evenly-distributed rays over the entire radio dial. On giant-size

the entire radio dial. On giant-size dials, more than one lamp will be used. The lamp's diameter is five-eighths of an inch, slender enough to be easily tucked out of sight.

Like the latest fluorescent tubes for general lighting service, the radio panel lamp is of the non-blinking, instant-start type. The transformer which steps up the household current for the radio "doubles" as a transformer for the lamp, which needs an initial voltage higher than the conventional household type.

Assembled from three parts—two end caps and a glass tube—the end caps serve as bases and electrodes.



This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre . . . at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4x361/4" band. The ideal portable unit.

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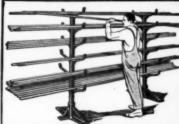
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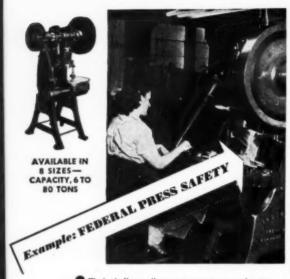
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MACHINE TOOL BLUE BOOK

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405



Today's "green" women operators make production safety even more difficult to control. Another reason why Federal Dial Feed Presses are so widely used. Illustration shows one in operation at American Cabinet Hardware Corp. plant. Note operator's position—convenient for rapid feeding, yet far from danger zone. Yes, Federals are safe—fast, smooth and precise, too. Get all the facts. Write for catalog.

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RUBBER IN MACHINE DESIGN

Rubber has been used in machine deign in the past largely due to its shockbsorption qualities. More recently, it has een incorporated into different devices ecause it expands in one direction when ressure is put upon it from another, and ecause it has splendid gripping or nonip qualities. Development of synthetic abbers has set rubber free from attack y oils, so this is no longer a limiting letor.

One of the earlier interesting applicaons in this respect was the use of a rubir drum of relatively small diameter, ored with a concentric hole thru the

center, so it would sliponto a machine spindle, or arbor, to be held in place with a nut. By slipping an abrasive sleeve, made of abrasive cloth or paper, over the rubber drum and then tightening up the drum with the spindle nut, endwise, it was made to expand circumferentially, so it would hold the abrasive sleeve firmly and concentric with the spin-dle. One company, at least, perfected this idea by making the drum up in sections, using a number of rubber discs, with bakelite washers set in between them. Using this method. more uniform circumferential expansion is obtained from one end of the drum to the other. Such units are used in either drill press or lathe spindles and are splendid for many types of sanding and grinding work.

Recently, a new departure in chuck design has been observed, which

allows only 12 production chucks and 3 detachable arbors to cover more than 300 single-purpose chuck applications. This is possible, because rubber is incorporated into a special collet. The collet has a number of hardened jaws of alloy steel, evenly spaced angularly and bonded together with oil-resisting Neoprene. Holes are provided in the jaws, thru which the Neoprene passes during the bonding, making the rubber and jaws one integral assembly. The outer edges of the jaws are tapered, making the assembly roughly conical. Pressure exerted by forcing assembly into a female cone displaces Neoprene, forces jaws inward.



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ANSONIA, CONN., U.S.A.

December, 1945

MACHINE TOOL BLUE BOOK



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MACHINE TOOLS AND METHODS FOR TOMORROW'S PRODUCTION

AIR POWER

When the curtain of secrecy was lifted on the radio-operated proximity fuse that automatically explodes a projectile within 70 feet of the target, it revealed the important role that Westinghouse engineers played in its development. Near the top of the list was a tiny wind-turbine that spins around 40,000 times a minute to supply electrical power to the radio circuit operating the fuse.

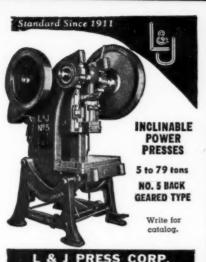
With a rotor no larger than the face of a pocket watch, the turbine begins to spin at its dizzy pace the instant the projectile leaves the gun. The turbine in turn drives a generator that feeds power to the radio circuit, where waves are emitted with the speed of light. As the projectile nears the target these waves are reflected to the fuse's receiving antenna and set off a detonating mechanism.

Westinghouse engineers first began work on the proximity fuse back in February, 1942. First idea to emerge was a fuse operated by an "electric eye." As the bomb or projectile neared the target, the normal intensity of light was interrupted and the "eye" a cted to flip a switch that exploded the projectile.

This was followed shortly by the first radio-type fuse in which a battery supplied the power to the radio circuit. Then in the fall of 1943, Westinghouse engineers came up with the turbine-powered fuse that made for safer handling and con-

tained an improved radio circuit designed by the men at the company's Baltimore Radio Division.

Production of the projectile fuse for anti-aircraft guns, mortars, and howitzers was centered at the plant in Sunbury, Pa., and included many hundreds of thousands of the Navy's VT (variable time) type units. This was a battery-operated radio unit, no larger than a plnt milk bottle, which used its nose cap as an antenna. Parts for the units had to be designed strong enough to withstand a pressure during flight of 10,000 times their own weight.





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TUBING

One problem that comes to the man on the production lines occasionally is that of holding tubular parts and indexing them so as to get evenly spaced cuts around them. In some places, this is solved by using a special type of indexing fixture, which is ordinarily equipped with collets, but can also be fitted with so-called step chucks and closers. These step chucks have the same operating speed as a collet and are operated by the same lever collet closing mechanism. A separate chuck is required for each diameter of work to be handled, the same

as in the case of a collet, and a closer is required for each normalsize step chuck.

The handling and processing of small copper tubing, of the type used so exten-sively in refrigerators, radiators, unit heaters. etc., is interest-ing. This tubing comes to the user in coils. There is need for equipment that will straighten it, as itisremoved from the coil, as well as to cut it to required lengths needed for assembly. At least one machine has been observed in operation, which functions of straightening and cutting this material to length. Once the end of a coil of tubing has been entered into the feeding rolls of this machine, the feeding, straightening, measuring and cutting of the material to length is automatic. Production

depends on the length of the tubes being

Various methods are employed for bending tubing, it being necessary to employ a process that will prevent the tubing from being distorted, flattened, or collapsed, at the point of the bend. Thinwalled tubing is more difficult to bend than any other kind. One of the best methods that has been found, is to fill the tube to be bent with a special alloy having a low-temperature melting point. This alloy, in fact, can be and is removed in boiling water, after the bend has been made.



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Left Hand-Reverse Image, Right Hand Shown

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R-101	L-102	5/16x5/16x21/4
R-103	L-104	3/8 x 3/8 x 2 1/2
R-105	L-106	7/16x7/16x3
R-107	L-108	$\frac{1}{2}$ x $\frac{1}{2}$ x $3\frac{1}{2}$



Right — 200 Series

1/2 x 1/2 x 3 1/2

200 SERIES

Below
Tool No.
300
301

Below — 300 Series

Tool No. Shank Size 300 1/4 x 1/4 x 2 301 5/16x5/16x2 1/2 302 3/8 x 3/8 x 2 1/2 303 1/2 x 1/2 x 3 1/4

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21/2	36	7/a	3.59	5	5/8	1	10.52
21/2	36	7/8	3.78	5	3/4	1	11.46
21/2	To	7/8	4.15	5	7/8	1	13.42
21/2	3/2	7/a	4.15	5	1	1	13.42
3	X6	1	4.10	6	3 16	1	12.50
3	1/4	1	4.10	6	1/4	1	12.50
3	386	1	4.35	6	5 16	1	12.50
3	36	1	4.54	6	3/8	1	12.50
3	70	1	4.79	6	716	1	12.50
3	1/2	1	5.04	6	1/2	1	12.41
4	30	1	5.67	6	5/8	1	13.92
4	3/4	1	5.67	6	3/4	1 or 11/4	15.12
4	X 6	1	6.36	6	7/8	1 or 11/4	17.89
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4	3/2	1	7.12	7	5/8	1 or 11/4	18.00
4	26	1	7.75	7	3/4	1 or 11/4	21.67
4	3/8	1	7.75	7	1	1 or 11/4	25.39
4	3/4	1	8.38	8	1/2	1 or 11/4	25.00
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15/64	12	9	1.75
1/4	12	9	1.75
17/64	12	9	1.85
9/32	12	9	1.85
19/64	12	9	2.00
5/16	12	9	2.00
21/64	12	9	2.25
11/32	12	9	2.25
23/64	12	9	2.50
3/8	12	9	2.50
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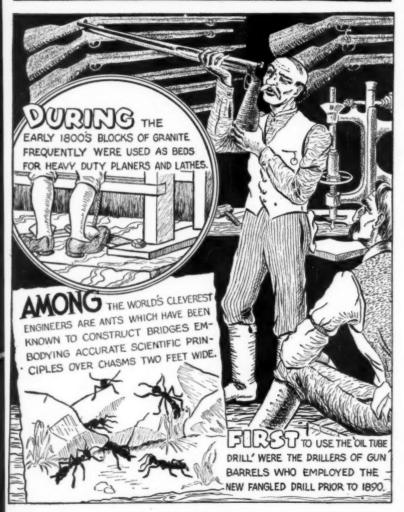
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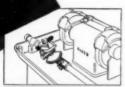
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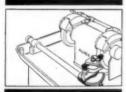
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Clamp tool in the built in toolholds and protractor unit. Set protractors to cutting and clearance angles.

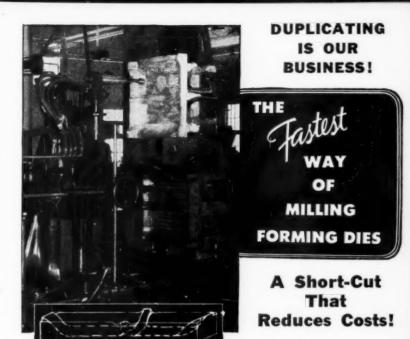


2. Grind tool by reciprocating motion across face of rough grinding wheel



 Slide toolholder unit to finish granding wheel without removing tool or disturbing angular settings.





STARTLING as it may seem to you if you have never tried it, the milling of forming dies can be done on an ordinary boring mill, equipped with a Turchan Follower Attachment, in one-half the time required by former methods, doing away with the necessity of buying special machines costing several times as much.

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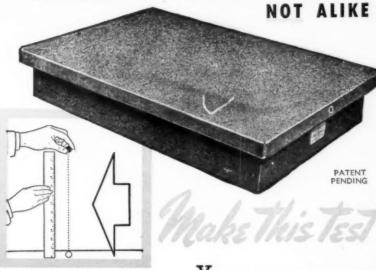
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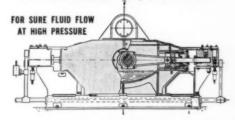
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